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[OFFICIAL NOTICE.]

First Annual Meeting, American Gas Institute.

AMERICAN GAS INSTITUTE,
OFFICE OF THE SECRETARY,
NEW ALBANY, IND., Aug. 27, 1906.

The first annual meeting of the American Gas Institute, composed of the merger of the Ohio, the American and Western Gas Associations, will be held in the Auditorium Hotel, Chicago, Ills., Oct. 17th, 18th and 19th, 1906, and will be called to order by Mr. B. W. Perkins, Altoona, Pa., President of the Ohio Gas Association, who has been selected as presiding officer.

The Auditorium Hotel offers rates to delegates as follows:

Single rooms.....	$2.00 per day and up.
Two in a room.....	3.00 per day and up.
Single room with bath.....	3.50 per day and up.
Double, or two in a room with bath....	5.00 per day and up.

Those expecting to attend the Convention are requested to secure rooms in advance of the meeting.

The following Passenger Associations have granted reduced rates on the certificate plan of 1½ fare for the round trip, plus 25 cents for each railroad certificate vised by the representative of the Passenger Associations, who will indorse the certificates: Central Passenger Association, Western Passenger Association, Trunk Line Association, Eastern Canadian Passenger Association, South Western Passenger Association, South Eastern Passenger Association, New England Passenger Association, excepting the Eastern Steamship Company.

These Associations include all the territory of the United States, as far West as Colorado.

Membership blanks have been sent to all of the members of the three above Associations.

It is requested that members avail themselves of the opportunity to become charter members at the very earliest moment, insomuch as 60 days has been decided as the limit for acceptance.

Acknowledgments of the receipts of applications have been mailed to all of those who have forwarded their application to the Acting Secretary. Failure to receive such acknowledgment is indicative that your application for membership has not been received. The Acting Secretary urges upon every person, who wishes to become a charter member, that they lose no time in sending in their application. The qualification for membership is as follows:

From Section 8 of the Constitution.—"Charter members shall be such of the present membership of the American, Ohio or Western Gas Associations as shall be certified by the officers of the same to the Directors of the Institute as qualified respectively for Active, Junior or Associate membership, provided, that to become a charter member it shall be necessary for each person so certified to make application to the Directors of the Institute within a period of 60 days after notice has been sent him of the formation of the Institute."

In the judgment of the joint committee, appointed by the American, Ohio and Western Gas Associations to organize the American Gas Institute, no person delinquent for dues in either of the above Associations shall be eligible for membership in American Gas Institute until such delinquencies are paid.

From Section 5 of Constitution.—"To be eligible to Active Membership, a person must be at least 26 years of age, and be an officer or other employee of a gas company, or a consulting gas engineer, or an employee of a consulting gas engineer. He must be competent to act efficiently as the manager of a department of a gas company's business, and must have his chief interest in the gas business directly connected with the manufacture, sale or utilization of gas, and not the manufacture or sale of apparatus or appliances used by gas companies."

From Section 6 of Constitution.—"To be eligible as a Junior Member, a person must be over 20 years of age and be in the employ of a gas company, or of consulting gas engineer, and must be qualified either by experience or education to hold a responsible position under such employers."

From Section 7 of Constitution.—"To be eligible as an Associate Member, a person must be engaged in a pursuit which constitutes a branch of gas engineering, or to be otherwise qualified to assist in promoting the objects of the Institute."

All charter members are exempt from membership fees. The annual dues, however, are payable in advance as soon as the permanent organization of the Institute is effected.

For those who are not members in good standing, in either the Ohio, American or Western Associations, and who are qualified to become members, the following membership fee, including the first year's dues will be charged:

Active membership.....	$25
Associate membership.....	25
Junior membership.....	10

Annual Dues.

Active membership.....	$10
Associate membership.....	10
Junior membership.....	5

A banquet will be provided for the Association members under the usual conditions, which have heretofore prevailed, each member attending paying an amount to be determined upon. The details as yet are not completed.

I would request again upon the members of the Ohio, American and Western Associations, that they attend to the notice received from the undersigned in reference to sending in their application.

LIBRARY OF CONGRESS SEP 1 1906 SMITHSONIAN DEPOSIT.

The undersigned will be pleased to answer all communications in reference to the meeting, and to send membership applications to any not eligible for charter membership, who may wish to become members of the American Gas Institute.

JAMES W. DUNBAR,
Acting Secretary.

BRIEFLY TOLD.

SECOND ANNUAL MEETING, IOWA DISTRICT GAS ASSOCIATION.—We are indebted to the courtesy of Mr. G. I. Vincent, Secretary of the Iowa District Gas Association, for the following summary of the proceedings of its second annual meeting:

DES MOINES, IA., August 27, 1906.

The Iowa District Gas Association has just concluded its second annual meeting after a very interesting session. The meeting was called to order promptly at 10 A.M., August 23, 1906, by Mr. L. L. Kellogg, President, of Sioux City, Ia. Mr. W. H. Bremner, City Solicitor of Des Moines, welcomed the Association with a few entertaining remarks, to which Mr. A. L. Lindner, Chairman of the Council, responded. The morning session of August 23d was devoted to general business and reports of committees. Following out the recommendations in the presidential address, it was decided to enlarge the scope of the organization in order to take in as active members men engaged in business in Nebraska and South Dakota, as well as in Iowa, and the name of the Association was changed to "Iowa District Gas Association." It was strongly brought out in this connection that the Association was, and expected to remain, a district organization, the object of enlarging the territory being only to give men in the States of South Dakota and Nebraska opportunity to engage in district gas association work. During this session there were also three impromptu discussions on "Inverted Welsbach Lights," "'A' Meters," and "Instantaneous Water Heaters." The afternoon session was taken up by the reading and discussion of a paper entitled "Something About Gas Arc Lamps," by Mr. Bert Mason, of Des Moines. After adjournment the Association took a special car on the Interurban Electric Railway, to Colfax, Ia., stopping on the return for an old-fashioned chicken supper, at a little town *en route*. The evening was spent at a summer theater in Des Moines, where the party was entertained by a clever variety performance. The Association voted the outing nnd entertainment a great success. The morning session of August 24th, which was called to order at 9 A.M., was occupied by the reading and discussion of the paper entitled "Oil Tar as a Dust Layer and Weed Destroyer," by Mr. George A. Waring, of Omaha, and the paper by Mr. A. T. Averill, of Cedar Rapids, on "Results Obtained in Iowa by Operation of Ammoniacal Liquor Plants." Resolutions were passed extending to Mr. Jansen Haines, Manager of the Des Moines Gas Company, who was confined to his home by illness, the sympathy of the Association. The afternoon session of August 24th was devoted to the reading and discussion of the paper by Mr. George Warnking, of Muscatine, Ia., on "The Gas House Equipment: Its Maintenance and Efficiency," and that by Mr. G. I. Vincent, of Des Moines, on "Some Brief Notes on High Pressure. A paper entitled "State Commissions for Control of Public Service Corporations" was read, but owing to the absence of the writer, Mr George McLean, of Dubuque, it was not discussed. Officers were elected for the ensuing year as follows:

President.—Geo. McLean, Dubuque.
First Vice-President.—Jansen Haines, Des Moines.
Second Vice-President.—A. L. Lindner, Muscatine.
Secretary and Treasurer.—G. I. Vincent, Des Moines.
Members of Council.—(One year)—A. T. Averill Cedar Rapids; E. D. Clary, Burlington; Austin Burt, Waterloo.
Members of Council.—(Two years)—Geo. S. Carson, Iowa City; A. W. Zahm, Mason City; Geo. H. Waring, Omaha, Neb.

The meeting adjourned *sine die* at 5 P.M. The annual banquet of the Association, held at the Savery at 8 o'clock the same evening, was a great success in every particular. Many interesting addresses were made by members and guests. The Iowa District Association, in closing its first real year's work, feels that much has been accomplished, and is looking forward to future prosperity and meetings even more successful than the one just closed.

DEATH OF MR. C. R. FABEN, JR.—With exceeding regret we have to report the death of Mr. Charles R. Faben, Jr., who for many years was in charge of the works of the old Toledo (O.) Gas Light and Coke Company, and the 10th President of the Western Gas Association. Our information is to hand in a telegram from Mr. Fred. R. Persons, dated Toledo, August 28th, which reads: "Charles R. Faben, Jr., passed away this evening. Sudden attack of heart disease." His life's record is that of a worthy man.

DEATH OF MR. H. C. SLANEY.—Mr. Henry Clay Slaney, works' engineer af the Williamsburgh Branch, Brooklyn Union Gas Company, Brooklyn, N. Y., since the retirement of Mr. Cross from that position, died at his home in Brooklyn, Saturday the 25th ult. He was born in Camden, N. J., October 21, 1851, and prominent in his connection with the gas business may be noted his services in the building of the plant of the Standard Gas Light Company, of New York, in the construction of the works of the Equity Gas Company, of Brooklyn—now a part of the Brooklyn Union Company—and his service in the latter's Williamsburgh branch. He is survived by his widow and three daughters. The remains were interred in the family plot, in the Camden Cemetery.

[Continued from page 367.]

FIRST ANNUAL MEETING OF THE NATURAL GAS ASSOCIATION OF AMERICA.

HELD IN THE ASSEMBLY HALL OF THE MIDLAND HOTEL, KANSAS CITY, MO., JUNE 12 AND 13, 1906.

FIRST DAY—AFTERNOON SESSION.

Following the discussion on Mr. Holmes' paper, for which the President assured him the members were very thankful, Mr. Frank L. Stuchell presented the following paper on

VARIATIONS AND CAUSES OF VARIATION OF PROPORTIONAL METERS AND THE SIMPLEST METHOD OF TESTING THEM.

To treat this subject according to the text I fear that this paper would be decidedly uninteresting, and, therefore, I shall ask your indulgence if at times I shall dwell upon matters which are foreign to the subject as given, but which are equally as important in the supplying of natural gas through proportional meters.

The causes of variation are: First, by meter not being set level; second, change in temperature; third, an accumulation of dirt or grit under valves; fourth, water on main regulating diaphragm or the shrinkage of same; fifth, shrinkage in the diaphragms of the tally meter or the stiffening of same by cold or heat; sixth, any leakage between tally meter and main body of meter, or body of large diaphragm. This applies particularly to the Wylie proportional meter. Seventh, lack of seal in tally, or leak in casting extending from outlet of tally meter to below dash-pot cover of a Westinghouse proportional meter.

Although there are several tests that can be made to ascertain the correctness of a proportional meter, it is not advisable to depend upon these tests as being absolutely accurate. It is far better practice and more satisfactory to send the meter to a repair shop, which is equipped with the necessary appliances for the proper testing of such meters. However, if a connection is made from a tap in the inlet of a Wylie proportional meter to a tap in the center of the main body of meter and the pressure taken between these points, and then if a connection is made from the tap in the center of main body of meter to a tap in the large regulating diaphragm cover and the pressure taken between these points, it will show that if the main portion of the meter is in good condition and working correctly, the pressure will be three times as great upon the connection between inlet and tap in the center of body of meter as it will be between tap in center of body of meter and tap in the large regulating diaphragm cover. This applies to a 1 per cent. meter having a capacity of 10,000 cubic feet or less, and if the meter has a capacity of more than 10,000 cubic feet per hour the pressure will be twice as great. If the pressure between the center of main body of the meter and the main regulating diaphragm is less than one-third of the pressure as shown between inlet and center of main body of meter, then the meter is running fast. If the pressure is greater the meter is running slow. As tally meters are interchangeable it is an easy matter to replace a defective tally.

As the dash-plate of the Westinghouse proportional meter answers the same purpose as the large regulating diaphragm of a Wylie meter, it follows that practically the same test can be made, as regards the correctness of a Westinghouse meter, in the following manner—by making a connection from a plug hole in the inlet of meter to the plug hole on the top of dash-plate cover and taking the pressure between these points, and then making a connection between the plug hole in the dash-plate cover and the top of tally meter and taking the pressure between these points. The difference between these two pressures will be practically the same as given in the test of the Wylie proportional meter of a corresponding capacity.

There is no set rule as to how often the main body of meter inclosing main valve should be cleaned, as the condition of the line supplying the gas will govern this matter. Where the supplying line is new and carries a considerable amount of dirt, the meter should be cleaned at least every 2 weeks, and I have found in practice that the less oil used upon the main valve and the valve seat, the better. I would advise the use of dry, white waste for the purpose of removing dust and dirt from the main valve chamber, and if oil is used at all it should under no circumstance be of a heavy nature; only mineral oil is of value in the care of proportional meters. My objection to the use of oil is that it collects dirt upon the valve and seat.

I find that it is of advantage to tap a 1-inch hole in the bottom plate under the main body of meter and closing this opening by the use of

a 1-inch stop. This is often convenient if water gets into the meter from any cause.

The oil used as a seal in the Westinghouse proportional meter should half cover the glass which is set in the side of the meter for the purpose of observing the amount in the tally.

A proportional meter should not be exposed to extremes of heat and cold. The sun shining upon a meter will soon draw the oil from the diaphragms of a dry meter, and intense cold causes these same diaphragms to become stiff and unyielding, while with a wet meter these extremes of temperature affect the oil to a certain extent and often close fitting brass parts are so expanded by this unnecessary exposure that the meter does not register properly.

Discussion.

The President—Mr. Stuchell lays down rules very essential to us all and I would like to have these points discussed fully.

Mr. Rose—I should like to ask in regard to these proportional meters whether it would be possible to get a correct test by hitching 2 meters tandem and basing the test on the results obtained through both meters.

Mr. Stuchell—I will say in a case of this kind we cannot make a correct test. On a Westinghouse proportional meter of 10,000 cubic feet or less, I was asked to make a test, and I could not do it with the 2 meters; using one new from the factory, and which we knew was working correctly, the other meter would not prove out right.

Mr. McDowell—How far apart did you set these meters in the test?

Mr. Stuchell—They were set very close together.

Mr. McDowell—How much straight run of the gas between each meter?

The Stuchell—Only a space of about 2 feet.

Mr. McDowell—You could not expect to get a correct test with so little a straight run as that.

Mr. Stuchell—Then we tried it again further on quite a distance—I would say 30 feet—but did not get much of a test.

Mr. Welch—I should like to bring out some of the other gentlemen on this matter. This is a very important part of the meter question. It is a very vital question with us to-day, and as we have with us several experts on proportional meters, I think we should get more information.

The President—Mr. Barnes, let us hear from you on this question.

Mr. Barnes—I hardly know where to begin on the question; I will probably get along better by having questions asked me, which I will endeavor to answer to the best of my ability. In regard to Mr. Rose's question as to whether one meter can be tested against another or not, I will say, that you cannot test one meter against another and get an accurate test on either meter; you may have an accurate test on either meter; you may have an accurate comparison; it is possible to get that if you are careful in making your connections, etc.; but as to a test on either meter, you cannot get it. In regard to a comparison on the 2 meters, both being subject to the same conditions, they should compare very closely. There is usually a variation from the absolute of about 4 per cent. or about 2 per cent. either way, which makes a total variation of 4 per cent., leaving 2 per cent. either way from the absolute in all meters whether they be proportional or not.

Mr. Whitehead—For the benefit of those here, I will say I placed 2 meters in tandem recently in the street car company's plant at Shreveport, La., and those 2 meters in 24 hours—one a 20,000 meter the other a 40,000 meter—showed a difference of 3,900 feet, passing 315,580 feet. That makes a difference of 1.9 per cent., or shows the smaller meter was running 1.9 per cent. slower than the larger meter.

Mr. President—Mr. Bullock, what can you tell us along these lines?

Mr. Bullock—I do not know that I can say anything. I am simply a user of the meter; the people who make it ought to know more about it than I do. We have about 500 proportional meters in use, and, of course, we have to watch them very closely to see they do not get out of order from various causes. The principal trouble we have had has been with dirt collecting in the meter under the valve. We read the meters every day and compare the readings with those of the previous day, and if we find any great difference we set to work to find out where the trouble is.

Mr. McDowell—It seems to me I am always perfectly safe in selling gas through a proportional meter, but never very safe in buying it in this way. I will tell you why. If you have a mills over here and you know what service they are doing and you have a man read the meter every day, and compare each day's reading with the previous one, and you find a falling-off, you know something is wrong; you have a check. These meters require constant watching because so much more gas passes through them than through others, but by watching the service and by keeping a daily record of that service, a check can be kept, so that if at the end of the month you find something wrong, you have some basis on which to make an estimate to the consumer. This plan works out satisfactorily, because if you know how many boilers are turned on, it takes as much fuel one day as another, but in buying gas in the field you have no check whatever.

Mr. Sears—Has Mr. Bullock experienced any trouble in keeping sealing fluid in these meters in the Joplin county field?

Mr. Bullock—We have had some little trouble, but in all cases we have found the cause and remedied it, so that now we are having no serious trouble of that kind. One man broke the seal, took the plug out and ran the oil out, but we discovered it, took the meter out and sent it to the shop and put in another meter. The next time we caught him we shut the gas off. He promised not to repeat the offense and we turned the gas on for him again, and he has continued to use it.

Mr. Sears—How often do you test a proportional meter?

Mr. Bullock—We have had meters running for 8 months, absolutely accurate as near as we can judge from the service. Of course, in some cases, where dirt may get into the meters, we have had to clean them as often as 3 times a week, due entirely to dirt accumulating. Once in a while a wet meter will get dirt under the valve and should be taken care of, as no meter will work when filled with dirt.

Mr. Moss—If a meter does not set plumb, does it affect the flow or the measurement of the gas?

Mr. Bullock—I think every meter should be set as nearly level as possible. We are very particular about this and see that every man thoroughly carries out our instructions along this line.

Mr. Welch—I should like to ask Mr. Holmes if it is not important that absolutely no water get in the sealing fluid, especially in cold weather. I have at times found slight trouble, due to the meter sticking and traveling slowly, which I attribute to this.

Mr. Holmes—What part of the meter?

Mr. Welch—The tally.

Mr. Holmes—The water would not affect this so long as it does not freeze. Water makes better sealing fluid if it does not freeze because it is heavier; but it will freeze. It is very important to keep water out of any meter, because it is very apt to freeze and cause the meter to stick. I believe a great deal of this supposed trouble with meters is due to imagination on the part of the consumer and the gas company as well. Invariably every natural gas consumer is inclined to suspect that his meter is going too fast, but it is very seldom you find one who thinks his meter is going too slow; and I think the gas company should stand up for the meter asserting that the meter is correct, no matter of what make it is; this I do not think they often do. When the consumer sees his bill going up he immediately blames the meter, whereas he forgets he is generating more power on this Friday than the Friday before.

Mr. McDowell—There is an uncertainty in the use of any meter when it may go wrong. I think meters should be tested frequently and care should be taken to see there are no leaks. I was connected with a concern once when several meter testers were traveling around through the country testing meters for a small fee. They found several of our meters running about 10 per cent. too fast, and upon examination it was found they had not been tested for 20 years. The party brought suit for 10 per cent. for 20 years, and the only way we had of getting out of paying this was to say it happened yesterday, and he could not prove it didn't; now that is the whole thing in a nutshell. On the other hand, in Ohio, where I am buying gas at the rate of 6,000,000 feet a day from one concern, the man taking care of the meter, watching the wells and pressure, etc., stated that he was satisfied the meter was running fast. This meter was accordingly tested and found to be running 50 per cent. fast; but because I could not prove that it had been running fast since January, I had to pay for that gas up to March 5th. It is pretty difficult to say when a meter is running fast.

Mr. Stuchell—In regard to Mr. Holmes' statement that a great deal of the trouble is due to imagination on the part of the consumer and the gas company as well, I should like to cite a little instance. I was once sent out to ascertain why a proportional meter was registering so fast when practically no gas was being used. (This was the state of affairs as reported over the telephone.) I went out, looked the meter over, examined the line first in the house—it was a private residence—but could find no leaks, or that they were using so much gas. I took the meter apart and cleaned it and found it in good order. I put a good seal on it and saw there was no leak from the tally of the meter to the main body. The gas was again turned on and the next meter reading time the same report came in, and we took the meter out and put in another of the same type; took the meter removed to the shop and tested it and found

it running correct. With his second meter the same complaint followed the next month, and after testiug this meter and finding it correct, we came to the conclusion that the trouble was due to the fact that the gas was being used on too great an elevation from where the meter sat. The meter sat about 350 feet from the house, in a little cave which was very dry. That is the only way in which we could account for this—the house sat so high from the meter there was a pull on the meter. Only a small amount or gas was being used in the house—one burner kept going to keep the dampness out of the house—and the gentleman owning the house objected to paying $40 or $50 when he thought his bill should be only $8 or $10; and the only way we could prove to him the meter was registering all this gas was to take a man along as a witness and show him the prover on the meter.

Mr. Holmes—There must have been a leak in the line from the meter to the house somewhere.

Mr. Stuchell—That may possibly have been.

Mr. Holmes suggested that the volume and pressure recording gauge might have proved a valuable machine on the meter Mr. Stuchell spoke of.

Mr. McDowell remarked that he thought all meters supplying gas under variable pressure on medium pressure lines are at the present time equipped with pressure recording gauges, and that they have been for a number of years; and if it were not for the cost he would favor putting them on for all consumers.

The President—If there is no further discussion on this subject we will pass to Mr. E. S. Springer's paper on

THE CHRONIC KICKER AND HOW TO HANDLE HIM.

In presenting to you at this meeting a paper on this subject, "The Chronic Kicker and How to Handle Him," it is not with the intention nor expectation of establishing a set code of rules whereby all chronic kickers can be governed. Were the human race so constituted that any two beings were of the same temperament, then such a culmination might be expected, but when we bear in mind the indisputable fact, as exemplified every day to the gas man, that no two kickers can be successfully handled, from a business standpoint, in exactly the same way, then a paper on this subject must necessarily be more of the reminiscent order.

You will note that I have qualified the phrase "successfully handled" by adding "from a business standpoint." Were we to eliminate this qualification, we could then easily prescribe various methods that would meet with unlimited success, and receive the unconditional indorsement of all gas company employees.

We all, of course, entertain a private opinion as to how he should be handled, and each would probably be considered constitutional by the gas fraternity, but legal authorities and well governed societies might take action against such methods, which would be to our detriment. The tendency of such bodies to-day is to adverse legislation and severe criticism regarding business methods of the public utilities. We must then recommend conciliatory methods.

The great majority of chronic kickers are people who have larger bills than they think they should have. For some unexplainable reason gas companies are looked upon by their patrons with distrust and suspicion, likely caused by their ignorance of our methods. Probably 90 per cent. of the gas using public have no faith nor confidence in a meter, and a great many have less confidence in the meter reader. They believe the meter a bluff, and think it the duty of the meter reader to guess at about how much they will pay. Should the amount be more than their own guess, trouble results.

My experience has shown that this class of kickers can be made good by explaining fully the mechanism of a meter, even to the extent, if necessary, of taking them to the meter repair shop and demonstrating to them just how it works, and convince them that the meter treats them more justly than any groceryman's scales that are operated by some ignorant or mayhap dishonest clerk. They can be shown how utterly impossible it is for it to register more than actually passes through it, and how impossible for it to register except when passing gas. From the meter repair shop, take them to the gas register, and show them that a continuous reading is taken; prove to them by the actual figures that are before you that you have the index of the meter when connected at their house, and from step to step they have been charged with the gas from that index up to the present index. Give him the total registration and let him verify it by his check book. We have cured more chronics by this method than any other ever tried. To illustrate, will cite the case of one whom we will call Mrs. Smith. She recently called at the office with blood in her eye and insisted on seeing the manager at once. I knew what was coming, as it wasn't her first visit, but hadn't time to escape. She was shown in and as soon as she crossed the threshold, began a tirade of abuse that, had it been a man as principal actor, would have made the air blue. After exhausting herself, I feebly remonstrated that we weren't nearly as bad as she thought, and inadvertently mentioned something about the meter. The word meter seemed to wind her up again and off she went. I had no idea that a meter could be so bad. To make a long story short, I finally succeeded in getting her to visit the shop and then back to the register with the result that she apologized before leaving.

This plan, however, doesn't always prove successful, as some will still have that lurking feeling of suspicion that makes them so unreasonable.

One incident of about 3 years ago, during the regime of manufactured gas, that I recall, was of a man who did us considerable harm in many ways, as he was quite prominent, and never failed to give us a kick if he had half a chance. His bill averaged about $6 per month, and we had tested his meter several times and always found it correct, although we could never convince him that it was so. One day I met him near the meter shops and took him in, going through all the details, etc., as outlined above. Still he was unconvined. As he was leaving he remarked that he wouldn't kick at $4 per month, but when it came to paying $6 and $7 he objected, as he didn't propose to maintain our establishment. I then made him the proposition that he notify his servant girl that hereafter he would allow her $4 per month to pay the gas bill, if the bill were less she could have the difference, if more she must pay it, and bet him a box of cigars that it wouldn't average $4 per month for the next 6 months. He took the bet and paid the cigars before the 6 months were up. When he paid it he remarked that it was the first time he had ever lost a bet and made money by losing. Never since that time has he made a complaint of any kind.

Some may question the wisdom of this method, as it cuts down the sales, but I would rather have a satisfied consumer at $4 per month than a kicker at $6. One satisfied consumer brings others; a kicker keeps them away.

Others will probably materialize that can be handled in neither of the above ways. It is then up to you to study his personality, and adopt some method that will suit his individuality. Universally he entertains some peculiar personal characteristic and through this feature you must work within his good graces. It is always best to listen patiently to his complaint, and if you find he has just cause to be dissatisfied, tell him so, and promise to remove the cause, *and then see that your promise is fulfilled promptly.* If he has no just cause, endeavor to show him why he is mistaken. Treat him with courtesy and fairness, and in the majority of cases your sfforts will bear good fruit. As Dean Swift said, "There is a good deal of human nature in all of us." We are all, in some degree at least, amenable to kindness and attention, and I do not think that even the most troublesome gas consumer may be fairly considered as an exception to this golden rule.

Discussion.

Mr. Lloyd—I think Mr. Springer has covered the ground pretty closely, and I do not think that I can help out any. I think you must handle the kicker with kid gloves somewhat; I believe as a rule, a kick can be adjusted to the satisfaction of the kicker. Sometimes to do this, when the kick is due to a large bill, you will have to change the meter and show them it is not in the fault of the latter.

The President—What do you do with the man coming in and kicking on his bill when he is heating with the gas? Say his bill with gas is $27 while with coal it was about $18.

Mr. Lloyd—I have shown them my bill at times. I have about as high a bill as anyone, and I find I am using the gas. In a great many cases we have helped them out by changing their appliances where they have been found at fault. We have found the average run of bills to be between $12 and $14; and think where the bills are high and you are perfectly sure your own appliances are not at fault, then you have good ground to go after your consumer and show him where he is at fault.

Mr. Rose—I have had more or less to do with complaints, and I believe sometimes too much attention is paid to kicks and complaints; oftentimes it is merely a force of habit. To cite an instance—I know of one man who has about 5,000 little meters toiling for him every day—he is buying his gas from another company—that is, for his own use in his residence, and he told me not long ago he believed his meter was wrong; and while I do not believe the man actually thought so, he just had a habit of kicking and did it without thinking.

Mr. Riley—I believe as Mr. Springer—that the first thing to do is to

allow the kicker to wear himself out; then deal with him in as nice a way as possible, explaining your appliances and bringing him in touch with your business as closely as you can, giving him an insight into your business. I think this is the best way to take care of a kicker.

Mr. Owens—I believe the best way to eliminate kicks on say high bills is to sell your customers a gas furnace, a gas heating stove or a gas range as the case may be. We have no trouble where they have gas stoves or furnaces, but just as soon as we put gas burners in wood or coal stoves, just so soon will we have kicks, and I find nearly always where there is a kick the consumer is justified in making it. In nearly every instance where there has been a complaint on a high bill, it has been found the fault of a poor appliance; but where we have put in appliances made especially for gas we have had no trouble at all; and that is the only way to eliminate kicks.

Mr. Bullock—Our experience in our business is mostly among business men who are pretty broad in their views, and we have had very little trouble. As Mr. Springer says, if we are in the wrong, we should correct ourselves at once; if not, we should try to show the complaining consumer where he is wrong.

Mr. Connelly—In a plan of mine, which I have found quite successful, the first thing I do is to tell the consumer we are just as anxious to find out what is the matter and to have the bill what it should be, as he is. Show him you are on the same side of the fence as he is, and it will give him confidence in you. Then investigate the appliances and find out what his trouble is; but if he knows you are on his side he will be a great deal better satisfied. It seems to me one of the best things to do is to assume just as much fairness on the part of the consumer making the complaint; help him explain to you what he thinks is the trouble. Often he will come in and say things in his excitement which he does not mean; but by having him explain his difficulty and looking at the matter from the consumer's standpoint as much as possible, and not from the standpoint of the company alone, in most cases complaints can be satisfactorily handled.

Mr. Barnes—I had the pleasure (?) of being the kicking point of one of the largest companies in the country for about 8 years Our experience was harder and we were very much more handicapped than you gentlemen are, inasmuch as we were just in the beginning of the use of gas appliances. We started in with a very poor grade of appliances to present to our people. A great many of the consumers were using their old coal appliances with whatever equipment could be had; of course this only lasted for a short period when we began putting in gas appliances. If it will not prove too tedious here, it might be a help to you people having no experience except along the lighting and cooking lines to give you briefly the manner in which we handled complaints which we found the best for us at least. In the first place we assumed every complaint that came in our office was a just one—that at least the person making the complaint was honest in his claims, and that he had good reason for grievance and to carry that assumption out and to prove it true, it was necessary to make a thorough examination in every case. First, we read the meter to see that no mistake had been made; then we make a thorough examination of each and every appliance in the house, providing the meter has been correctly read and bill accurately rendered. We examined the appliances, because in the early days we found trouble was due in a great many instances to faulty appliances—old coal ranges with open grates, of which we have a great many in the East; base burners with very poor gas burners in them, bad laundry stoves, water heaters—in fact going through the whole line of heating appliances, he reported every detail, a record of which we kept in the office and showed the complaining party who, by appointment, came to the office again if we failed to see him at his house and make explanation. We made it a point never to make an explanation of this nature to anyone except the man or woman of the house, and we made it a point that all this information we had gathered from this examination got to them. We preferred to have them call again, but if they did not, we wrote them a letter explaining everything and advising them what to do. In our city we furnished no appliances, sold no appliances, but recommended appliances; not inferior appliances, but those of good grade for different work. Now, as I said, we made a record of the result of this examination, and if the same man or woman came in again to kick, we referred to our books to see if they were chronic kickers. I could tell just when and for what reason each person objected to his bill, and I believe the same system is carried out in that office at the present time. This was our method for handling kicking consumers, and as a rule we got along nicely. We had troubles, of course, but we could smooth them over. The question was asked what to do when a person comes in and complains about an excessive bill as compared with the coal bill. You will find it a fact and a strong argument that people going from coal to gas will use three times as much heat from gas as from coal; that in itself is a strong argument. You can prove it to a man in this way—a man having four fireplaces and using coal will, two-thirds of the time, have no more than two of them going, but the gas is so easily lighted that they heat their whole house with it; that is one of the strongest arguments to the question asked. Say a man is burning coal, he will use it in the dining room and kitchen probably all the time, but in the parlor only when they have company, but if he is using gas, he will have fire everywhere. The gas is so convenient and as they have not learned to use it yet as economically as possible, they are therefore using more than they think; but you can usually get them to reason in this matter. Another strong point to strengthen here is that a meter reader cannot cheat a consumer in reading the meter; it is hard to make them believe this, but it is a strong argument that one right reading on a meter corrects every previous bill.

The President—We thank you for your remarks, Mr. Barnes.

Mr. McDowell—You spoke, Mr. President, of a gas bill of $27 for fuel with a former bill of $18 with coal. In my own neighborhood at home when the electric light first goes into a new house, we always find it brilliant in every window at night, and always say to my wife, "You just watch the Jones' after the tenth of next month, and you will find the windows dark," and that is the case with natural gas; they don't take care of it. They have to learn to burn natural gas economically. Ask them if they are taking care to see that this gas is being burned economically; if they are shutting it off when they are not using it. Then again in the winter we find that in the months of January and February the consumption in the same year in January was 95 per cent. above that; so that in July and August it will be correspondingly low; it will run way below the average. For instance, the average consumption per day per consumer for the year 1904 in 75 cities with which I am familiar was only 433 feet; yet the consumption in the same year in January was 95 per cent. above that; so that is a thing you can show a consumer—that while his fuel bill will run an average of $40 all the year round, there will be part of the time when the consumption will be very low, and the rest of the time very high, and of course this is expected. Out of 6,000 consumers, taking them as they run in a city of 100,000 people, in the months of June, July and August, 5,000 of these consumers used less than $1 worth of gas apiece a month yet at the end of the year the average was brought up to something over $40 a year.

Mr. Dunkel—I should like to say that what Mr. McDowell has brought out has been my plan right along dealing with the kicker, that is, to show them an annual statement; the gas consumed will not equal what they previously paid for coal and artificial gas for lighting.

The President—If you have a man who kicks hard and wants to remove the gas from his coal stove, would you advise him to try an appliance made for that special purpose? In other words, is not the coal stove with the gas burner in it a rather crude arrangement anyway, and cannot he put in a natural gas heater and get so much economy that we can afford to throw out the old stoves and get new ones?

Mr. McDowell—This is true of heating stoves, but not of cook stoves, because the gas is so much cheaper than any other fuel they can use it anyway.

Mr. Barnes—Perhaps you did not understand the question. If they are using gas in a coal stove fitted up for gas, would you advise them to throw out the coal stove and put in a gas stove—something made especially for the purpose?

Mr. McDowell—It is always better to advise that, but many times they won't do it, because they cannot afford to do it, and I say a cook stove can be fixed up with gas burners and used much cheaper than they have been able to use coal.

The President—Yes, while we know if you put a gas burner into a coal or wood cook stove the gas bill will doubtless be cheaper than wood or coal, yet it is cheaper to throw the stove out and put in a regular gas range.

Mr. McDowell—That is true, but I have had men sometimes go so far as not to recommend gas in coal stoves, and that is where they make a mistake,

The President—Yes; by recommending gas in a coal stove, you can often get a consumer where you would not otherwise get him.

Mr. McDowell—There are a great many consumers—who if you have not already found them you will sooner or later—have but one stove, sometimes not more than two, to heat the entire house, in which cases they probably heat the kitchen and dining room with the coal cook stove, and you cannot talk gas stove here, because you could not heat both these rooms with a gas range as you can with a coal range

equipped with gas. Perhaps you have not noticed this, but you will.

Mr. Rose—Is there any one who has made any tests to show the actual difference between a converted stove and regular gas range?

Mr. Barrows—We made a number of tests in Kansas City, Kas., and from 10 to 15 per cent. seems about as near as we can get to it. Cooking on the top burner there is a very slight difference; but for baking where a large mass of material must be heated before the oven reaches the proper temperature, there is a marked difference. For heating houses there is no difference to speak of, because you are putting so much heat in an appliance, no matter what kind it is, providing it is not going out the flue; in the case of heating there is a difference of only 1 or 2 per cent. between the regular gas heater and the coal heater equipped for gas. In taking on a new consumer we try to sell them a gas range, and if they say it is going to cost too much, we tell them if they put the gas in their coal range it will take possibly 10 to 15 per cent. more gas to do the work done on a gas range built especially for gas, but that if they wish to save the money at first and pay a little more each month—it is not going to amount to very much—then by all means put a burner in the coal range; and later on if they find it is burning a great deal more gas than their neighbor's gas range, they can put in a gas range.

Mr. McDowell—I have known a great many good consumers to be lost by the representatives of the gas company telling them they must have a gas range. We recommend gas appliances in every case and urge people to buy them; at the same time convince them that they can burn gas without modern stoves if they wish to do so.

The President—All this has direct bearing on the business and is quite interesting to us.

Mr. Rose—I should like to ask the opinion of the gentlemen in regard to putting bricks in stoves. Lots of people fill the stoves with bricks and I should like to have the opinion of the gentlemen here if I may.

Mr. Mitchell—We started to discuss a paper on the Chronic Kicker, now we have got to bricks; but the brick business is something we will discuss before the meeting is over.

The President—I think we will now have the paper of Mr. J. L. Maloney, of Leavenworth, Kas., on

THE BEST METHODS OF INSTALLING LOW PRESSURE BOILERS AND HOT AIR FURNACES TO GET BEST RESULTS.

In treating this subject the fact must remain evident that each installation, whether in a hot water boiler, low pressure steam boiler, or hot air furnace the local conditions have to be considered, and if unfavorable, overcome. However, I am satisfied that there is one best way whereby success will be met with in the great majority of cases.

The following statements are simply based upon actual experience gained after a number of years' work in this particular line.

Perhaps the most essential thing necessary to one's success in making satisfactory installations of any kind is competent labor; men who will use their own heads and not leave a piece of work until they are satisfied that the best possible results have been obtained. A good fitter can often make a poor burner do fairly good work, but an incompetent man is a detriment to the business.

In working with a low pressure steam or hot water boiler or hot air furnace, or any other appliance demanding a large supply of gas, it is necessary to know that the meter, service and pipes to location of appliance are of ample size to furnish gas in sufficient quantity at all times and under conditions that will exist in a few years as the business increases and the draft on all supply lines becomes correspondingly great. The question of volume is of greater importance than that of pressure.

To obtain the best results from the start it is necessary to clean a boiler or furnace of all soot and ash that may have accumulated in and about the sections of the boiler or dome of furnace. This deposit will naturally be burned off by the gas in time, but it costs money to do it, and at a time when a consumer is in doubt as to whether the gas can used as economically as solid fuel.

All accumulated soot should be removed from the chimney flue and a solid damper placed in the pipe leading from the furnace to the chimney.

The installations that I use in fitting up a hot water or low pressure steam boiler are practically the same.

Uutil recently I have been in the habit of using side fires, consisting of perforated 1¼-inch pipe extending along sides and back of boiler in fire box; this pipe is divided into 12-inch sections, each supplied by one 1¼-inch mixer located in ash pit; but the past winter I have obtained better results in the use of a burner especially designed for this kind of work, each burner so constructed that it will throw a flat jet flame 10 inches wide at an angle of 45° against the water leg of the boiler. The size of the fire box would govern the number of burners to be used. For the average installation I would have the header, in front of boiler made of 2+¼-inch tees, the number of tees conforming to the number of burners to be installed. I much prefer ¼-inch angle wheel valves for use at header and ¼-inch pipe from the valve to the mixer, which is always placed directly under the burner and in the ash pit.

It is always my aim to have a fire with plenty of force and vim to it, the first ½-inch of the flame a decided green color, changing to blue, and I do not object to cherry red streak in the flame, but would not allow of a fire having a yellow color to it.

Unnecessary air should be excluded from the main combustion chamber by the use of sheet iron placed between the burners and mixers. Enough air can be taken through the 1¼ inch mixers to cause proper combustion. It is seldom that a sheet iron bottom is so tight fitting that the fire smothers. However, should such be the case, openings can be made in the sheet iron to overcome this difficulty.

The nipples or pipes extending from valves to burner should be thoroughly reamed, and it is not good practice to have the pipes leading from the mixer to burner less than 6 inches in length; shorter nipples would allow the fire to flash back into the mixers.

I get the best result by setting this burner about 1 inch from the water leg of the boiler, for the reason that the flame leaves this burner at an angle of 45°, and about 1 inch above the grate line; but if I were installing the 1¼-inch perforated pipe fire the distance from the perforation to the water leg should not be less than 3 inches. Unless a boiler contains a deposit of mud in the water leg, it is best to apply the flame low; if I failed to get results with burners so placed I would consider that there was possibly 2 or 3 inches of mud in the water legs and consequently raise the burners. However, this does not often happen.

It now remains to adjust the damper and regulate the fire so as to have the flame lively and cause the tongues of flame to travel as far as possible among the sections of the boiler and allowing only enough heat to escape through the flue to carry off all products of combustion.

In hot air furnace work I select a 3, 4 or 5 section burner according to the size of the furnace in which the burner is to be placed, the burner being 4 inches less in diameter than the firepot. I find that a clearance of 2 inches is desirable at all points between the outside edge of the burner and the firepot. The burner sections must be heavily cast and well bolted together to keep them from warping. This is especially important if the consumer insists upon using broken firebrick on top of the burner as is often the case. I favor a burner that will throw the flame at a slight upward angle which prevents the flame from striking the firepot and rebounding back and under the burner sections. The burner sections should be of good size, containing a large amount of gas at the point of combustion to insure a strong, steady flame, and if too small will not permit of the fire being turned low without flashing back into the mixer.

I have been unable to see that the use of broken firebrick or artificial fuel is of advantage in furnace installations. When possible I discourage its use as it is especially injurious to the burner, and soon the fire becomes imperfect, caused by brick crumbling and getting into the burner.

A burner section supplied by one 11-4 inch mixer should be about 6 inches wide from outside to inside edge, about 3 inches from top of upper plate to the bottom of the lower plate and 12 to 13 inches from end to end along outside edge, should be placed in the furnace so that the flame will strike the firepot at a point where the solid fuel worked best. Usually 3 or 4 inches above the grate line is right. I use 22 gauge sheet iron placed between the burner and mixers and insist that all mixers be placed in the ash pit, and that all nipples leading to and from mixer and to the burner chamber be thoroughly reamed. To insure the burner being set solid I use a ¼-inch tee placed below mixer, a nipple of proper length capped extending downward so that each section rests on the cap, the side opening of the tee leading to the header.

I am careful to see that all valves are well packed at the stuffing box gland before they leave the shop; if used as they come from the supply house they are generally sure to leak.

For the class of work mentioned in the foregoing, the orifice in mixer should be ¼ of an inch, and as a rule I do not use the air shutter, but allow all the air to enter that will pass through mixer.

With an ample supply of gas to any boiler or furnace I have no trouble in obtaining satisfactory results.

It is possible that the future may develop many improved methods in the economical consumption of natural gas, but as it is demanded of me to get satisfactory results now I follow the lines as explained above and avoid experimenting as much as possible. As early as 1889 I in-

stalled sectional furnace burners and there have been very few improvements added since that time; new wrinkles have been tried out and lost sight of. It is my policy to get the consumers on as soon as possible giving them the best appliances experience has taught me, and after the business has been taken care of I may do some experimenting.

It is amusing to see the way experiments have been tried in this Western gas territory within the past 6 months. A great amount of labor and money has been wasted. It is very proper to work new schemes out in the shop or manager's residence but poor policy to try their new ideas upon consumers who suppose you know your business.

It reminds me of a story recently related, in which an advertiser had painted upon the side of a barn the picture of a cow. A farmer came by leading a calf which broke from him ran and stood by the picture. After repeated attempts to lead the calf away the farmer said, "Well, gol darn you, stay there; but I'll bet you know the difference when supper time comes."

This may be the case when the first gas bill comes.

[In Mr. Maloney's absence this paper was presented by Mr. C. W. Sears.]

Discussion.

The President—We all know Mr. Maloney to be a man of practical experience, and his paper is worthy of much consideration.

Mr. Rose—I should like to ask what his particular reason is for installing the mixers in the ash pan.

Mr. Sears—I suppose I will have to take the brunt of that. We have threshed that point out two or three times now, and I maintain that the best results can be obtained where the mixers are directly under the burner, thereby eliminating a certain amount of friction. A great many have placed the mixers on the outside and got good results, but the reason we do not favor it is the fact that the gas passes from the orifice through the long pipe and elbows and from there up in the burner, thus losing a certain amount of energy and force, while if the mixers are placed in the ashpan, the gas passes straight up into the burner and we get a better fire. Moreover, the mixer in the ashpit is away where it cannot be tampered with by the landlord; while if he tampers with it he is liable to throw the fire out of adjustment.

Mr. Bullock—With this arrangement it is not necessary to make such a large hole in the stove to get the pipe through the opening in the fire pot.

Mr. Welch—Also the difference in specific gravity between the air and the gas has something to do with this. There is a tendency to separate the air and gas, and if the mixer is too far away from the burner the separation taking place is not complete to a certain extent, causing uneven combustion, and the results obtained are not as uniform as they should be. I believe it is generally conceded that the mixer should be directly under the burner.

The President—Mr. Owens, have you anything to offer along this line?

Mr. Owens—I am here to learn on this question. I have nothing to offer. However, I am convinced that Mr. Sears is very thoroughly convinced that the place for the mixer is in the ashpan.

Mr. Barrows—Like Mr. Owens, I am here to learn; but I should like to ask regarding one or two points in Mr. Maloney's paper. He spoke about a solid damper; does that mean a damper that fills the flue entirely? If so, I do not approve of it at all. I think a perforated damper, or one that does not fit the pipe tightly, should be used, the perforations being as small as possible to allow the products of combustion to pass off if the damper is shut tight. We always use a check dratt too. Also, regarding broken firebrick, we used it last year because we could not get patent fuel, but it is very pliable and will crack and break very easily. I would recommend patent fuel when any fuel is used at all; it gives a white heating surface for the gas to come in contact with, and more often insures proper combustion; that is, the regulation does not have to be as perfect as it must be when there is no such heating surface there. It is impossible that a firebrick tile of proper shape would be very much better than artificial fuel on the burner. I know something of that kind is being gotten up now by one of the appliance companies, and if they had expected a discussion on this paper I know they would have been here.

Mr. Lloyd—In regard to mixers, I find that a mixer too short is as faulty as one too long. I find on the low pressure work we had a firing back on short mixers. A mixer 12 to 14 inches long does better work than one 3 or 4 inches, when working under low pressure.

Mr. Barrows—A large furnace company here in the city have been working on a furnace which they expect to put on the market this fall, for several months, and if they had expected a discussion on this subject to-day, I am sure they would have had a representative here. They brought it over to our side of the river to try it with our gas, and desire pointers as to how that furnace should be constructed. We have criticised it as well as we could ourselves, and if it would be possible for them to enter into a discussion to get pointers, it would be to the advantage of all of us. It is their desire to build a furnace that will answer our requirements out here, and I think it was their impression that this paper would not be presented this afternoon, as they expected to be present when it was read.

Mr. Lloyd—For the purpose of inducing gas manufacturers to obtain higher efficiency in the manufacture of appliances, I move, gentlemen, that this discussion be carried over until to-morrow. (Motion seconded and carried.)

The President—I think we have been right patient this afternoon. I have never been in a meeting where such close attention has been given, and I think you are now entitled to a rest until to-morrow morning at 10 o'clock.

SECOND DAY—MORNING SESSION.

The President—We have with us this morning Mr. B. E. Chollar, ex-President of the Western Gas Association, and an engineer of national fame, and Mr. Chollar, we want to extend to you the privilege of the Association.

Mr. Chollar—I thank you very much for the privilege. I have been an artificial gas man ever since 1863, belonging to gas associations for more than 25 years, and I was very much surprised to see the number of gentlemen assembled here this morning. We had to work for our gas; these gentlemen just have to catch it as it comes out of the ground.

The President—Before taking up the paper we carried over for discussion, this morning we made a trip to the Kansas City, Kas., office, and to their storeroom, or shop, rather, and investigated a hot air furnace, which seems to be a right good one. It is being tested there now; and, Mr. Lloyd, can you give us any idea as to the probable efficiency of the furnace, or have you got it far enough along?

Mr. Lloyd—I have simply done nothing to it yet; I have made no tests. The furnace was made by the Prest Heating Company.

Mr. Sears—I am sorry Mr. Barrows is not here; he mentioned yesterday afternoon that some firm was contemplating making a new burner of some kind, using a sort of fireclay tile on top of the burner. Mr. Barrows thought those people might be here this morning.

The President—It is a new gas burner for heating. Mr. Barrows spoke to me about it.

Mr. Monroe—Mr. Barrows probably referred to a burner which I brought to his attention—a burner we are bringing out this fall along these lines—simply a high power burner. We found after going through last winter in the Western field that it was a question of a capacity burner; that we would have to make a burner of larger capacity on account of the low pressure of gas used; and following up that idea we are bringing out a number of burners, one of the features of which is this firebrick tile.

The President—Mr. Monroe, do you think it is absolutely necessary to have the brick in order to retain the heat in the furnace, or would you advocate just letting the heat strike the sides of the furnace—for instance in a cold air furnace—without the bricks? Or do you think the brick or fireclay balls will assist in keeping the heat in the furnace?

Mr. Munroe—The question of filling of any kind in hot air furnaces or steam boilers is not exactly to retain the heat in the firebox; the principal application of filling on the burner is more to keep secondary air from rushing through to the burner. The question of low pressure is brought up by Mr. Duncan, in which he wishes to know if it is not possible to make outside appliances to reduce a pressure say to 8 ounces or lower; and if so, what the means are, and why we cannot run a boiler plant on 5 or 6 ounces.

Mr. Kidner—We do not have any trouble in getting furnaces at any pressure where we do have trouble on 3 to 3½-ounce pressure; and a pressure of 5 to 6 ounces would be more satisfactory on all jobs than either a higher or much lower pressure. But as for reducing the pressure from 8 ounces to 4 ounces, regulators are made to reduce from a high 8-ounce pressure to as low as 3 or 4 ounces; and in towns where they are carrying 8-ounce pressure they could easily instal a low pressure regulator to reduce that pressure on each job to 3 or 4 ounces.

Mr. Duncan—You do not seem to understand my question. I understand what a regulator is for, but why is it not posible for us to use outside appliances to assist the burner to be run on less pressure than 8 ounces? Is it not possible?

The President—I understand we have all agreed that a 4-ounce pres-

sure is preferred; is that not right for burners and for domestic use? That is what we have in St. Joseph and I understand it is about what they have in Kansas City, Kas., and Leavenworth—a 4-ounce pressure. Now, if you have a higher pressure, a governor will have to bring it down to this pressure, which is 4 ounces.

Mr. Duncan—But the trouble is that some of our factories are not able to run on 4-ounce pressure; they need nearly 1 pound pressure.

Mr. Bullock—I think I understand what the gentleman is getting at; and I would say it is not so much pressure as volume to get efficiency. The size of the appliance should be taken into consideration and a header line maintained sufficiently large to deliver the amount of gas needed to fire the boiler and not reduce the pressure. We have some boilers that are so large and the pressure so low we cannot get burners enough in the doors to supply sufficient amount of gas to fire the boiler to its capacity, and in a case of this kind we had to put burners in at the sides; we would put in as many good burners as possible in the front and then complete the efficiency by putting burners in at the sides of the boilers—enough to maintain perfect combustion and with header line large enough to convey gas enough without reducing the pressure.

Mr. Holmes—About 14 years ago we supplied power from our factory in Pittsburgh for the electric light company in Allegheny, and very often we did not have 1 ounce pressure—sometimes 2 ounces, but more often we did not have 1 ounce—and we overcame the low pressure by putting a very large header around the boiler so as to get the volume of gas right at the boiler and we had no trouble in keeping up 123 to 150 pounds steam with gas under 1 to 2-ounce pressure. It used to be considered impossible to run a kiln in a brick yard with less than from 1 to 30 pounds pressure; if they didn't have lots of roar, they were not getting any heat, but the trouble with most of them is, they would run a single line in and take headers off that for their gas, and have dead ends instead of putting a pipe around the brick kiln from the regulator to the point of combustion.

At this junction the President advised reading the paper of Mr. C. L. Bullock. before going on with this discussion, on

THE BEST METHODS OF HANDLING INDUSTRIAL CONSUMERS OF LARGE CAPACITY.

The handling of industrial plants of large dimensions is a subject upon which much could be said and many figures made. I have entirely eliminated the figures and have only a few words to say regarding some of the important policies which should be adopted in each new field.

My experience has been that when introducing gas in a new field for industrial purposes you are confronted with all kinds of questions regarding the life of the field; how long the gas company will be able to supply, the cost of installation, etc. These questions can be easily handled, but the most important of all is the comparative cost of natural gas with their present fuel. This matter is very important and the most delicate to handle. I believe that every effort on the part of the gas company or its employees should be not to go too deeply into figures, for if this is done, before you are aware of it you have some kind of a statement regarding cost that is so impressed upon the prospective consumer, he goes home, takes up his cheapest monthly fuel bill and prepares at once to defeat your statement and hopes he may secure a cheaper price. I have found that it is best in all cases for the gas company to take the initiative and say to the prospective customers; we will install gas in your plant, be to all the expense, and at the end of 30 days if you are not satisfied with the new fuel we will remove the gas appliances, replace everything as found, without cost to you, and leave it entirely to your judgment whether you will burn gas or return to your present fuel. We find at the end of this stated time it leaves the consumer unprejudiced relying upon his own judgment, doing his own figuring, and he alone makes up his mind whether he will retain the the most convenient fuel known to man or return to the coal proposition.

Great care should be taken that the highest efficiency is obtained in all installations, especially in the first few, for if the report goes out on the start that the first plants are successfully operated it has great influence to extend new business. On the contrary, if there is any question as to results it has a tendency to throw a wet blanket on the future business and causes delay.

Regarding the installation of boilers, some good type of burner should be used, one that will not stop up with dirt and one that can be easily adjusted. Attention should be paid to the adjustment of the air draft and a damper should always be placed in the stack that will give the stoker absolute control of the stack temperature. The arrangement of the fire chamber should be such that the heat can be spread uniformly over the entire heating surface maintaining perfect combustion.

These details require careful study and wide experience and should be handled by competent workmen skilled in this particular line.

Some changes will have to be made, as boilers of the same type and make will not always work the same with the same construction.

Gas is also used for metallurgical work with great success, but in most instances in this line of work a furnace has to be constructed for the special work to be done. The initial cost of fuel for this work is not of vital importance, as in most instances the output of the mill is increased to that extent that the consumer could not afford to return to coke or coal if it were given him free.

Great care should be taken to deliver the gas at a uniform pressure; two regulators should be used where the service is taken off of the high pressure line. The first regulator reduces the pressure from main line pressure to 15 or 20 pounds, the second regulator reducing from this pressure down to ounces. This makes the consumer's property safe from fire and accidents to employees.

Great care should be taken to instruct the engineers, or stokers, how to handle the fires economically. The regulators and meters should always be the property of the gas company. They should be securely boxed and locked and accessible only to the proper employee of the company. The meters should be read each day and compared with the reading of the day previous; in this way by the meter reader visiting the mill each day any dissatisfaction on the part of the service can be remedied at once and when the time comes for payment the gas is satisfactory and checks forthcoming.

These are the principal policies that should be adopted. They were adopted by the Jasper County Light and Fuel Company, and in 12 months we furnished gas fuel for 500 mills and shafts in the mining district of Kansas and Missouri and placed in successful operation 70,000-horse power.

And with this plant now in successful operation and giving entire satisfaction we believe that gas is too good a fuel to be used under boilers and we are using every effort to induce our customers to install gas engines. We have a number of them on and find that gas at 25 cents per 1,000 feet for engines is a saving of 85 per cent., when the best gas engines are installed, over the cost of gas consumed under boilers at 10 cents per 1,000 to do the same work.

I have not gone very deeply into this subject, because I feel that the boiler business is nearly a dead issue. This subject has been threshed out pretty thoroughly, and I believe they all understand it.

Discussion.

Mr. Mitchell—We all know Mr. Bullock as one of our experts in applying natural gas under boilers, and we hope his valuable paper will be fully discussed.

Mr. Barnes—In regard to what Mr. Holmes said about operating under low pressure, I have in mind one of the largest glass factories in the country which run on as low as 1 ounce pressure; in fact, during the winter months they never had over 1 ounce and very often not that much. They were running a large furnace with 60 pots in it, and they would run there sometimes with not enough pressure to make an impression on a mercury column; but we always aimed to give them 1 ounce pressure and they did not care for more. This was possibly due to the fact that they had sufficient volume. As has been said several times, in all sorts of work appliances can be made that will give the best and the most uniform work on extremely low pressure; but to offset the low pressure we must have volume—volume we want rather than pressure. It is a mistaken idea that pressure aids you in any way whatever in the heating proposition. The main thing is to get a uniform pressure and sufficient volume, and pressure must be sacrificed every time rather than volume. Now, in regard to Mr. Bullock's paper, I can only say he is perfectly right in every assertion made; and regarding the question which came up here respecting brick yard work, I can cite an instance of such a yard in Pittsburgh supplied off of a dead end of a domestic line; and this is one of the largest yards in Pittsburgh—that is, in view of kiln capacity. They build 450,000 bricks to the kiln, which makes it over 70 bricks high, and which it would be impossible to do with any other fuel than gas, as from 44 to 50 high is the extreme height with solid fuel. The pressure on this particular line at any time during the year is never above 4 ounces in the domestic district through which it runs and supplies the customers, and you all know what it would be at that dead end, and yet at this brick yard, they have no trouble in turning out brick; drying, burning, etc., and they claim they are making the cheapest brick from a fuel standpoint in the city of Pittsburgh, and I know that

anyone interested in the brick work can write them and get valuable information. They are the Entress Brick Company, Webster avenue, Pittsburgh, Pa. They use ordinary appliances; nothing special, the same appliances used throughout the country.

Mr. Ewing—In just what way is the gas introduced into the kilns? After having the large headers which will supply the volume, will 2-inch pipes into the side of the kiln be large enough, and how near together should they be?

Mr. Barnes—In answer to Mr. Ewing's question I would say the only change in the building of the kiln, that is, in the building of the brick, is they are built closer together. That is, there is a set way of building brick in a kiln for burning. They are set in groups a certain distance apart, allowing for the passage of heat around each individual brick. The arches are built just as they are for coal. They use 1¼ to 1½-inch mixers, no matter which, and a fairly short nipple is used, which is aimed to carry the gas inside the arch or into the arch proper. I do not know the exact orifice opening into the mixers, but it is probably about $\frac{3}{16}$ of an inch, perhaps a little smaller; depending a good deal on the size of your kiln, that is the width of it and the amount of gas you have to put in to do the work. Another thing is the covering over of the kiln on top. After the water smoking is done, they immediately cover the brick with asbestos sheet, just loosely; not enough to make it perfectly tight, but just simply enough to leave a draft conductivity, similar to a draft in a boiler flue. Now, this is about all there is to the burning of gas in a brick kiln, and it is about the simplest way you can burn it. As a result of burning brick with gas, you get a better grade of brick, more uniform throughout the kiln. You get less soft brick than if coal is used.

Mr. Sears—Does this apply to vitrified brick, or just building brick?

Mr. Barnes—We make very few, if any, vitrified brick in Pittsburgh, but I always maintain that anything you can do with any other fuel, you can do a little better with gas. I had a statement put to me here by one of the brick men that it was impossible to burn paving brick with gas because you cannot get the heat high enough; now, you all know how much truth there is in that argument from the fact that you can get almost any heat. When you can get heat sufficient to melt sand to make glass where it requires about 4,000° F., I think you can do most anything.

Mr. Sears—There is a brick yard at Lawrence which Mr. Dunkel had great hopes of securing, but they claim they can burn a better brick with coal than with gas.

Mr. Dunkel—They are burning oil now.

Mr. Sears—These people claim that certain elements derived from the burning coal are absorbed by the brick and enter into the hardness thereof.

Mr. Barnes—I am not an expert chemist, but I believe that where anything is burned with moisture in it, it rather gives off than absorbs; and in regard to burning satisfactorily, gas can be burned also. Of course, both the gas man and the coal man claim advantages over each other's fuel, and perhaps the brick dealers have this means of selling their brick by claiming that a certain fuel-burnt brick is better than another. This, of course, helps their business, and we cannot blame them for it.

Mr. Shreve—This brick man mentioned before claims a brick burned with gas is more porous after you are through with it than one burned with coal or oil, and he says in Kansas City, Omaha and several other places, they have refused to buy gas-burnt brick. Now I do not know whether there is anything in this argument or not; it may be he cannot compete with gas-burnt brick, and holds this out as a means of selling his brick.

Mr. Barnes—Just along this line there is this possibility, and it rests entirely with the burning: You can force your early fire; in fact, you can force your work all the way through, or retard it at your will, with gas, and it is possible to spoil a kiln of brick or to change the density of that brick by the manner in which the fire is forced. This all depends on the person doing the firing, and he must study the fire and the brick; he must know what he is doing. He cannot drop from coal into gas and burn it rightly at first. The material used in making the brick determines the shortest length of time in which you can burn a kiln, and you must know the material from which the brick is made. A great deal depends on the person, but with a knowledge of his materials and a knowledge of the fire, it has been proven for the last 20 years that you can make a better quality of brick of any kind with gas; from the finest pressed brick down to the ordinary lime brick. Down the Ohio river, where probably 30 per cent. of the vitrified brick sold in the Central West is made, they use gas entirely for burning, and make a very high quality brick.

Mr. Springer—Has Mr. Barnes had any experience with down draft brick kilns, and what is the economy, if any, over the ordinary up draft kiln using gas for fuel?

Mr. Barnes—From comparisons about the same economy prevails.

Mr. Holmes—I think this was a very excellent paper Mr. Bullock read; rather short, but to the point. In regard to the control of regulators, I think the gas companies are too lax in the control of regulators; they put them where the consumer has access to them and can manipulate the pressure, with the result that he gets a pressure too high and does not get good results from his gas. In the case of a brick yard the bricks are burned around the arches, whereas with low pressure gas this does not occur, and the consumer is more satisfied; so we should keep the regulators under our supervision.

Mr. Welch—In regard to the pressure at which gas should be burned under boilers, I would like to say a word regarding the burning of gas under boilers and the pressure at which it should be burned. I have had considerable experience in this line, and for a long time burned gas under pretty high pressure, so I am familiar with this method of handling the work. I have been doing a considerable amount of work in low pressure, and I do not know of a case where a gas supply brought to a boiler at the low pressure of 4 to 6 ounces does not produce satisfactory results; that is, when appliances are used of sufficient capacity. A good many people have the idea that 8, 10 or 12 ounces are necessary, but such has not been my experience. I do not know whether the subject of burners has been brought up this morning or not—that is, burners for hot air and hot water furnaces; but perhaps Mr. Ransom can give us some information along this line.

Mr. Ransom—I am here to learn; it is information I am seeking. I am interested with the Prest Heating Company on a gas furuace. We are only experimenting, and we should like to find out just what is the most economical and best burner to put in our furnace. We are working on something that will burn the gas economically, which will benefit not only the consumer but the gas company as well; for the more economically the furnace can be operated the more furnaces the company will take on; and so I should like to hear from anyone representing a burner concern.

Mr. Owens—I think the discussion this morning pretty thoroughly covered this ground, and Mr. Ransom will have a chance to get that information when he receives a printed copy of the proceedings of this meeting.

The President—Yes, Mr. Ransom, you will receive a printed copy of this discussion in a short time, which doubtless will give you some information along this line. We want to thank Mr. Maloney, in his absence, for his paper. We could keep on discussing it and get good pointers from it, but we must keep moving. We will now have Mr. Thomas J. Little, Jr.'s, paper on

THE ILLUMINATING DEVICES OF THE WELSBACH COMPANY.

To trace in detail, from the date of its inception to the present time, the growth of incandescent gas lighting would be practically impossible, unless the entire time of the convention were given to that purpose. Dr. Bunsen, the inventor of our invaluable Bunsen burner, little imagined that his burner would revolutionize the lighting and heating systems of the world. It was Dr. Auer von Velsbach, of Vienna, one of the greatest chemists the world has ever known, who, in 1880, while working in Dr. Bunsen's laboratory in Heidelberg, doing spectroscopic work in connection with the study of some of the rare earths, found by experiment that he could impregnate a cotton fabric with a solution of rare earth nitrate, and after burning the cotton away a delicate ash would remain, thus enabling him to study the material by the aid of the spectroscope, after it has been brought to incandescence in the Bunsen flame.

Later he conceived the idea of forming a hood or mantle of rare earths and suspending it over the Bunsen flame to produce artificial illumination. He was discouraged by Dr. Bunsen and generally ridiculed and discredited by the scientific world at large and the gas fraternity in particular, like many others of our early inventors. For 7 years he experimented with many oxides, starting with erbium, which gave a brilliant green light, and finally, in 1887, producing the lanthanum-zirconium mantle, which gave approximately 12 candles to the cubic foot of gas. This was encouraging when we consider that the flat flame burner gave only from 3 to 4 candles per cubic foot. Companies were formed in all parts of the world to manufacture mantles under the Welsbach patents, but owing to the fragility of the mantles and their rapid deterioration, the venture seemed a complete failure. The Vienna factory and laboratory were sold. The American factory

at Gloucester, however, struggled on with the lanthanum-zirconium mantle, and made heroic efforts to make it a commercial success, but it was uphill work; apparently the system was dying.

At what appeared to be the psychological moment for the industry, Dr. Auer, who had been constantly experimenting in his Vienna laboratory, with a view to producing a commercial success, struck upon the thorium-cerium mantle, which is the modern Welsbach mantle. With the early lanthanum-zirconium mantle, natural gas, with its high heating value and unlimited pressure, looked attractive, but there were many difficulties. We were compelled to ship saturated webs from Gloucester factory to our natural gas distributing centers, where we operated branch factories. there burning out the cotton, hardening the delicate ash over powerful flames, mounting the mantles on burners and carefully installing on the fixture of the consumer. To-day we see the mantle a phenomenal commercial success, spreading to uses never dreamed of by the pioneers. For instance, we now make an especially hard inverted mantle for railroad car lighting, burning on Pintsch gas, and several hundred cars are so equipped. These mantles are so hard and strong that they will last far several months, and no anti-vibration device is found necessary to prevent their breakage.

We are also making very large lighthouse mantles and shipping them to all parts of the world.

The incandescent mantle burner has occupied the attention of the inventor ever since the inception of the mantle. The early burners appear to us now ridiculous, with the trestle like appearance and their faulty design and construction. It is imagined by many that all burners are alike. They are only in the fact that they all burn gas; but from the standpoint of efficiency there is a very marked difference. I have recently tested such a burner which has an efficiency of but 15 candles to the foot of gas, while a good burner on the same gas, and at the same time, gave 22 candles to the foot. On natural gas the conditions for best combustion are slightly different from artificial gas. In the first place, the high calorific value as well as the higher working pressure make it especially desirable for incandescent lighting. For the highest efficiency on any gas we endeavor to crowd as much gas with the required proportionate amount of air as possible within the mantle, thus as the gas pressure is increased the ability of the gas jet or jets to entrain air is greater in consequence of the increased jet velocity of the gas. This condition is especially noticeable on the high pressure lighting systems. The highest lighting efficiency ever obtained, to my knowledge, was with the new process gas lamp, a self-intensifying lamp using two mantles, having a heat motor above operated by the hot products of combustion and in turn operating a fan blower, forcing a large volume of air at so low a pressure as not to be distinguished on the water gauge, mixing and pre-heating the air and gas and soft blast flame. This lamp has given almost 1,000 actual candle power, consuming but 20 feet of artificial gas, which means an efficiency of nearly 50 candles per cubic foot of gas. On natural gas the efficiency would be considerably higher. The gas pressure is immaterial, when using this lamp, as the gas supply flows into the burner, the air being pumped. The natural gas burner, using as it does a gas of high heating value, must in consequence entrain more air than if the same volume of artificial gas were used, and as to increase the gas pressure increases the jet velocity with its consequent ability to entrain more air, we find that we require the higher working pressure for natural gas, the most common practice being to carry about three times the pressure of artificial gas. When needle valve Bunsens are used, a smaller orifice is required for natural than for artificial gas, but the Mason multiple hole check as used in the standard burner of the Welsbach Company works equally well with either gas. This is especially desirable as it is often necessary to change from one gas to the other.

It has been found that the construction of a burner gauze had much to do with the proper working of the burner. A small spreader or washer secured to the center of the gauze while giving the best results on artificial gas gives comparatively poor results on natural gas; the resultant mixture passing through the tube is greater, and in this case the spreader in the center of the gauze simply impedes the flow through the top opening of the burner, consequently a plain gauze is used. In addition to this, an extra gauze is supplied with each burner, to be placed in the mixing chamber should the excessive pressure cause the burner to roar.

For general work, I prefer a 4 ounce pressure for natural gas and while it is perfectly possible to obtain a very much greater candle power by increasing the pressure, the burner is likely to roar, to obviate which the extra gauze mentioned above should be used to more thoroughly mix the gas and air. The same result may be obtained by lengthening the Bunsen tube. This, however, gives the burner an unsightly appearance. The lower pressure therefore is more desirable, as the use of a lower gauze causes considerable trouble to the consumer on account of its collecting dust, which the consumer invariably neglects to clean out when renewing the mantle.

It is of the greatest importance that the gas pressure should be held uniform, and while good burners will operate satisfactorily over quite a wide range, if carefully adjusted, at the mean pressure, they are more frequently over-adjusted at the lower pressure by the consumer, and as the pressure increases, the flame will stream up through the mantle. The adjustable gas check has been of the greatest service to the incandescent lighting system, and is absolutely essential even though the gas pressure in the building is held absolutely uniform, for every mantle has a variable form, one having a full shape requiring considerably more gas than a tapering mantle, and it is consequently found necessary to adjust the gas check each time the mantle is placed on the burner. The external cap support mantle is by far the best for use on natural gas. The center support necessarily requires a socket to secure it in the center of the gauze, which socket is retained in position by the use of a washer, and as before mentioned this washer greatly interferes with the working of the burner. Never was cleanliness nearer to Godliness than in the incandescent gas burner. Any accumulation of dust on the inner surface of the Bunsen tube or under the gauze will greatly reduce the efficiency of the burner and quite frequently will cause the mantles to carbonize. It is highly important therefore that you educate your consumers to clean the burners each time they renew mantles, and more frequently, if you can get them to do it.

The gas arc lamp has been successfully adapted to natural gas. I have gotten the best results by using a high, alabaster globle, surmounted by a brass stack or draft inducer. The globe should be of large diameter, and high in order to remove it as far as possible from the mantle flames. In addition to this, the high globe, when used in conjunction with the metal stack, gives in effect a long chimney, which is especially desirable on natural gas. The metal stack should not be too small in diameter as there will be a tendency to check the draft rather than to augment it, as we are handling a large volume of the heated products of combustion and air. The nickel finish also stands better on the stack of larger diameter. This stack should be made of heavy weight sheet brass, heavily nickel plated, as I consider the substitution of sheet iron for brass a great mistake in lamp manufacture, as such shells frequently leave the drawing dies badly wrinkled and they will never take as good a nickel finish as the brass shell. They also show a tendency to rust. I have seen such lamps rust-pitted over their entire surface. The arc lamp gives the best results when the burners are equipped with plain gauzes and the mantles should be suspended from above, and not on center supports, as there is a marked increase in candle power when the wire gauze is used instead of the pierced metal cap carrying a center support. The old opal glass ceiling shield has been superseded by a metal baffle plate, and the glass reflecting shade has been omitted, leaving but one piece of glassware to maintain. I am now referring to the lamp using a large pear shaped alabaster globe, scientifically designed to softly diffuse most of the light below the horizontal, making the reflecting shade seldom necessary.

The inverted gas light has made its debut on the American market, and while there are a great many worthless burners and mantles being sold, the mere fact that they are sold would indicate a demand for a good burner and I may say that after a great deal of experimental work in all parts of the country we have succeeded in producing a burner and mantle which I believe will prove as successful as the standard upright burner, and one that will lend itself to the adaptation of a variety of glassware. All will concede the greater decorative possibilities of the inverted light. The new burner works equally well on natural or artificial gas. The efficiency is extremely high and the useful light, *i. e.*, the lower hemispherical candle power, is much greater than with the upright burner. We have obtained with a flat opal shade and a clear cylinder, on artificial gas at 2 inches pressure, 3-foot gas consumption, 118-candle power directly under the lamp, while with the deep cone mirror glass reflector suitable for store window lighting, 277 candles were obtained on 3 feet of gas. Much better results than these can be obtained on natural gas. The most important factor in incandescent gas lighting is the selection of the proper mantle, and the best mantle is one giving a mellow light, in addition to the fact that the light is softer and more pleasing to the eye, is more efficient both initially and after burning for a long period.

A 1,000-hour endurance test of the mellow mantle will frequently show at the end of the test a drop of only 25 per cent. or 30 per cent. in candle power, while the white light mantle will have dropped 50 per cent. or even 60 per cent. during the same period. The mellow mantle

is also stronger and shows a lesser tendency to shrink. All mantles whiten with age, due to the fact that the cerium becomes inactive, consequently the greater the cerium content of the mantle the longer can it be burned before giving that greenish ghastly glare which is so severely criticized by your friends, the electric light men.

In electrical circles it is deemed expedient to discard lamps after they have dropped 20 per cent. from the initial candle power, which means with a 3.1 watt lamp an average life of about 600 hours; consequently I believe a similar practice would be beneficial to the gas business. Mantles could be renewed after they had dropped off 25 per cent. or 30 per cent., and if the mellow light mantles were used this would not be an unreasonable proposition. With a low grade white mantle, however, which is very lightly saturated with the lighting fluid, you would be compelled to replace them every couple of hundred hours to maintain your high standard of lighting, and, of course, this would be prohibitive. Little wonder then that we see such miserable demonstrations of incandescent gas lighting throughout the country, where the cheap white mantles sold by peddlers are used. Quite frequently the peddler or unscrupulous dealer will purchase mantles for 6 or 7 cents and sell them for as much as 25 cents, and the poor public blame their lighting troubles on the gas man.

The question is frequently asked why high grade mantles sometimes break as readily as the cheaper mantles. This is caused by shock in transportation or rough handling on the part of the dealer or consumer. To obtain the best results in incandescent lighting, therefore, I would suggest that you carefully educate your customers to the use of the mellow light mantle, to handle it carefully and keep his burner clean. This is being successfully done at several points throughout the country.

Discussion.

Mr. Sears—I would like to ask Mr. Little what, in his opinion, causes the white deposit on the inside of the chimney, using the mantle as the light giving power; whether it is the lead being drawn out of the glass by the intense heat, or whether it is from the cerium being thrown off from the mantle.

Mr. Little—It is caused by the material in the glass being affected by the heat; but take a better class chimney and you will not get this result; so it is just as important to select a good class chimney as it is to get a good mantle, because a poor chimney will break and spoil a good mantle.

Mr. Sears—Is the price of the better grade of mantles not about the same as it was a number of years ago?

Mr. Little—The price is very much lower. The mantle that sold for 50 cents a year ago we now sell for 30 cents.

Mr. Sears—The reason I asked, the price of material has dropped, and I wondered how it affected the price of the mantle.

Mr. Little—All foreign mantles, especially in Germany and England, are more lightly constructed than they are in America, but I am inclined to believe the maintenance there is a little better. The public seems to be better educated in the maintenance of their lights; they are very careful in cleaning the burners, and are very careful to place the mantles on very easily, while here in our country it is very often done by people who know nothing about it whatever. Consequently we find we have better success with a heavier mantle.

Mr. Sears—You spoke of making a mantle to be used in a railway coach with Pintsch gas to stand all that jar and last several months. Can consumers be expected to use that mantle, or is the price prohibitive, or is it not suited to the burner?

Mr. Little—The mantle is extremely heavy, and if it were put on the ordinary pressure it would not light up. It must be used with Pintsch gas under pound pressure with a specially designed burner. The fact is we might get better results from a lighter mantle, but it would not stand the shock. This mantle is very hard; it feels like a piece of china.

The President—Since I have been in the natural gas business I have heard a good many remark: "We don't care anything about the lighting business; it does not amount to anything." Now, in my opinion, we cannot have a better ad. for the natural gas than a good light. A good light will stand out in front of the people at all times and speak for itself; and I say it is just as important to have a good light with natural gas as with artificial gas, even though we do not derive as much revenue from it. The advertising alone is worth our efforts.

Mr. McClain—I should like to hear something about the principle of lighting the streets of a town with natural gas.

Mr. McDowell—I have had considerable experience in street lighting with natural gas, operating plants in about 50 Eastern cities. Probably 25 of them are using natural gas for street lighting, more or less, and some cities and villages are lighting exclusively with natural gas. I would not advise any gas company to undertake the lighting of a city themselves. It is a business by itself, and unless you are especially prepared for it it is annoying, requires time and careful attention, and it has been our practice to let this to companies who are about making these contracts with city councils for the lighting of streets, charging so much per light per month or year, and buying the gas of the distributing company. In one instance the price charged to the Welsbach Company is about $5 or $6 per year per single light, or $10 for the double light. Where street lighting with natural gas is taken care of in this way, in my judgment, there is nothing to compare with it; but where it is taken care of by the city itself, or where the gas company undertakes the care of it without special arrangement, I have never seen it so very successful; in fact, it does your business more harm than good. A ragged, dirty chimney, and the flame running out at one side, is a give-away on your entire business. I can tell the instant I enter a town whether or not it is taken care of in the lighting proposition right; and I would suggest that you go slow in taking charge of this work yourself, but that you recommend cities to contract outright for the care, because there is a great deal of care connected with it.

To the question, "Is there any way for us, not being experts, to tell a good mantle from a poor one?" Mr. Little replied that that is a pretty hard thing to do, because a mantle appears to be a mantle to most people, and the only way to test a mantle is to test it in some laboratory properly equipped for that purpose. Seriously speaking, this is a serious proposition; you know the electric light people do not buy lamps indiscriminately; they have them tested very carefully; they could not think of using some of the low grade goods on the market; it would simply ruin their business, and we cannot afford to do it either at a time when the electric light competition is becoming very active in advanced methods to get business and their new lights. To get the best results in incandescent lighting, I would recommend that the mellow light mantle be used; it is stronger than the white light mantle and shows less tendency to shrink.

The President—Are there any other remarks on this subject? I am sure the Association is under great obligations to Mr. Little for his paper, and we wish to thank him for coming here.

There being no further remarks, the meeting adjourned until 2 P.M.

(To be Continued.)

[Prepared for the JOURNAL.]

Rickety Gas Engines.

By "ARTISAN."

When the gas engine produces certain annoying sounds, the indications are that something is wrong. There are sounds made by the exhaust gas and others by the friction of parts which have gummed or become worn. Engines of the "hit-and-miss" type of governor give forth irregular sounds when running under excessive loads, when the belting connections are untrue or slack, and when the minor parts of mechanism become choked with foreign substances. In gas engines of the throttling valve description, the exhaust reports vary in volume of sound due to a worn or gummed condition of the mechanism of the governor, or the igniting apparatus may be disordered. In the first cut is shown some cause for the failure of the ignition to act regularly. The sparking is effected between the point of the movable electrode and the insulated electrode as at *A*. In one instance the spring used for the operation of the lever carrying the motion from the cam consisted of a spiral arrangement adjusted over the extreme point of the movable electrode. This spring has become broken and sections of it folded over as at *D*, rendering the spring non-effective. The contacting factors were handicapped and the ignition was irregular and an annoying, thumping sound came from the mechanism at every turn. The point of the push-cam was found to be in a worn order so that the end of the lever failed to receive the correct motion at *C*, due to loss of motion. The lower or insulated electrode at *B* was in a sprung condition and bound a little in the bearing.

These conditions may be found in machines of different types, and are often the direct cause of sounds coming from the apparatus. If you crank the engine slowly the various faults may be detected very easily and steps taken to put things to rights. If you find the valves in a gummed condition and sticking, it may be necessary to do something more than washing off with lye water and re-oiling. It may be necessary to do more than some adjusting. Grinding may be needed. In fact, it is a good plan to have a grinding outfit in the shop where

gas engines are rectified. Fig. 2 is a diagram of a good outfit for this service. First the hardwood stand is made for a base and to this the uprights are fitted with metal boxes for the bearings. Then the shaft for carrying the cylinders may be put in. This should be about 1¼ inches in diameter and long enough to readily receive the three treating wheels. The first wheel is an emery cylinder and this can be purchased ready made and keyed to the place as shown. With this wheel you can do some grinding. Flour and emery and some lard oil on a cloth will do for light work, with hand rubbing. But for important work, where there is much grinding, the wheel will work in very handy. Then on the same shaft there may be the common grinding stone as next shown, and this will be useful for general grinding purposes. The other wheel is made up of the flanges of metal, between which are adjusted the thicknesses of fabric for rubbing purposes. The revolving texture can be used to clean parts very thoroughly. The belt wheel is set screwed or keyed to the outer end of the shaft and is operated by a belt as shown.

In Fig. 1 we exhibit the plan of the spark coil, and as sounds may be generated from this point, when the winding of the wires is incorrect, let us examine some of the processes of construction of the coil. The spark coil is employed as an intensifier as is known. It must transform the current. If the spark coil is properly made it can raise a low voltage from the batteries to a very high voltage, thereby developing the usefulness of the same. The make of the wiring is illustrated in the next cuts. Annealed iron wire is used for the portion we exhibit. About 16-gauge is chosen and all are completely insulated from one

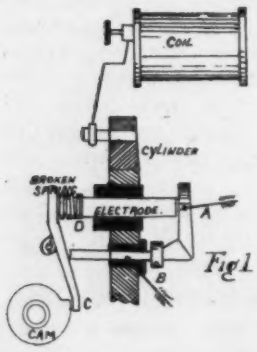


Fig 1

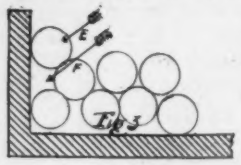


Fig 3

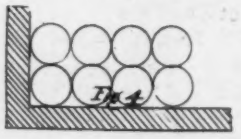


Fig 4

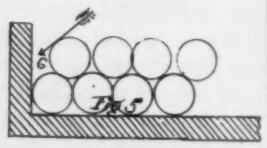


Fig 5

Fig 6.

Fig 7

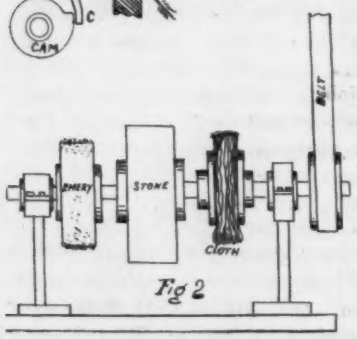


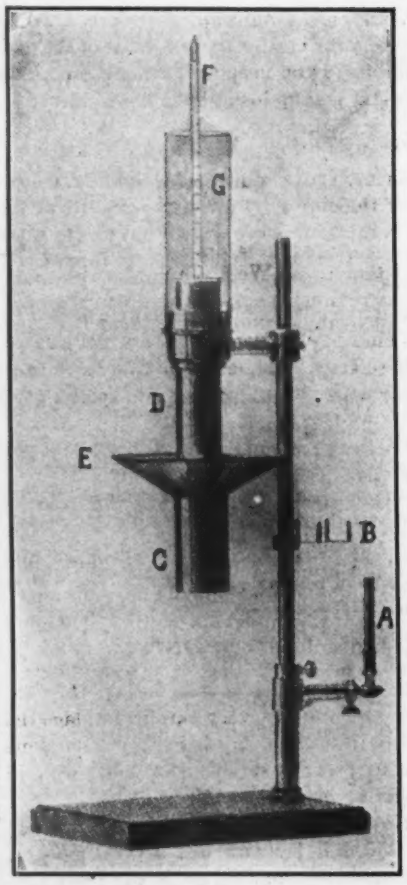
Fig 2

another. A defective insulation has been the direct cause of serious troubles in this connection. In fact, the sounds which are often produced in gas engines may be located at inferior coils and commutators oftener than elsewhere. The commutators of old used to run dry, or were supposed to run dry, and they got "cutting" and the contacts were thrown out of action and irregular sparking resulted and undesirable sounds were brought forth from the engine. In Fig. 3 is shown an improper mode of winding coils. The wiring is planned so that the coils do not lay evenly. One layer overlaps the other. There is no order in the plan, and coils *E* and *F* are thrown from position and are crowded as shown. Another mode of winding, more even in detail, is shown in Fig. 4, in which one coil is arranged to fit directly on top of the other. Then again the mode of winding shown in Fig. 5 is used in which the coils are dropped down in between the coils of the lower layer. This makes a space at *G*.

However, there is uniformity obtained in both the systems of Figs. 4 and 5. In winding, care too should be taken to place the wires in order and free from kinks. A regular winding device should be put up and the coil of wire held firmly in this while the end is in process of winding upon the cylinder. I have seen kinky wire and wire with broken insulation used for this purpose. Trouble always arises in such cases. Then again I have seen joints made in the wire and the chances taken of getting the wire in place in the cylinder. Often the form of union is right and then again it is made in a shiftless manner, as illustrated in Fig. 6. In this special case, the workmen lapped the ends of the wire over, forming the hooks as shown. Then he bound the whole thing over with tape. The light contacting points of the wires soon burned off and the current failed to pass and the engine was altered in its mechanism before it was discovered that the failure to spark was due to the defect in the coil. The coil had to be opened and the examination revealed the imperfectly made union. Some men make sure of getting a full and complete contact of the ends of the wire in the joint by twisting the ends as in Fig. 7, binding over the same with tape in the usual way.

Raupp's Gas Calorimeter.

The *Gas World* reports that at the last meeting of the Mid-Rhine Gas Association, Herr Friedrich Lux read a paper on Raupp's new gas calorimeter. After discusssng the recent developments of industrial requirements as regards the calorimetry of gas, which had led to the introduction of Junkers' calorimeter, he proceeded to discuss Raupp's new instrument. This is based on the fact that a solid body through which heat is being conducted takes a certain time for a certain rise of temperature to be attained at a given point in it; and that this time is shorter the greater the flow of heat. The new instrument presents a base and vertical rod on which runs a gas burner, *A*, an optical flame-measurer, *B*, and a copper body, *C D*, with a non-conducting jacket.



This copper body presents a hollow, and is massive above at *D*, with the hollow widened at *C* below, and at the top it has a thermometer, *F*, fitted into it, reading to tenths of a degree C. The heating chamber (the widened hollow in the lower part, *C*, of the copper body) presents radial slits through which the products of combustion escape, and there is a construction, *E*, with non-conducting layers, for the purpose of preventing heat from these products of combustion from reaching the thermometer. The thermometer is also sheltered from outside influences by a glass chimney, *G*. The burner, *A*, can be turned round on its ring, and springs into one of two positions, either with the flame opposite to the flame-meter, *B*, or with the flame centered in the hollow of the copper body, *C*.

The mode of use is the following: The burner is supplied with gas at a known rate, and the flame is allowed to go on until it becomes steady. The ring which holds it is then brought to such a level that the tip of the flame comes to the same level as the two wires in the flame-meter, *B*. Now read the thermometer to $\frac{1}{10}^{\circ}$ (C.) and note the temperature. Next spring the flame into position under the copper body, *C*, and at the same instant set off a stop-watch reading to fifths of a second. For 2 or 3 minutes there is but little change in the thermometer, but then the temperature begins to rise, and it rises more and more rapidly. When it shows a gain of 10° C., stop the stop-watch and note the time taken, which, as the apparatus is made, will be from 6 to 12 minutes.

Evidently an apparatus like this cannot give absolute data—it can only give relative results—and so each apparatus has to be standardized by burning in it some gases whose heating values are definitely known and supplying with each such calorimeter a card showing the meaning, in absolute units, of certain definite stop-watch readings, and (by calculation) of intermediate stop-watch readings.

The apparatus has, as compared with Junkers' calorimeter, certain advantages and disadvantages. The disadvantages are: (1) Readings not in absolute units directly; (2) a series of observations cannot be

made in immediate succession; (3) the degree of exactitude is less. The advantages are: (1) Cheapness; (2) no water supply and outflow required; (3) much greater simplicity, so that unskilled persons can work it; (4) no calculation is required; (5) the time taken is less than with Junkers' calorimeter. The two systems, therefore, do not compete with, but supplement one another. For very exact work Junkers' remains indispensable; but for ordinary day-to-day work in a gas works, one test or so per diem, this apparatus is completely sufficient.

Dr. Lux intends, later on, to give detailed numerical results of tests to be made as regards the efficiency and accuracy of this apparatus.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by Royal E. Burnham, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

827,075. Apparatus for the manufacture of illuminating gas. Carl W. Bilfinger, Brooklyn, N. Y., assignor of one-fourth to Columbia Engineering Works, and one-sixteenth to Absalom P. Backman, New York, N. Y.

827,081. Apparatus for the manufacture of gas. Philip I. Cohen, New York, N. Y.

827,113. Treatment of tar for the manufacture of pitch and recovery of light oils. William Oppenheimer, Ewell, England.

827,342. Incandescent gas lamp. Lee T. Alton, New York, N. Y.

827,380. Intense light lamp. Paul Lucas, Shoneberg, near Berlin, Germany.

827,592. Time gas lighting and extinguishing apparatus. Thomas F. Westenholz, Hellerup, Denmark.

827,621. Gas burner. Irving C. Daily, Kenova, W. Va.

827,755. Incandescent gas burner. Milton H. Samson, Chicago, Ills.

827,796. Means for automatically extinguishing lamps. Edward J. Frost, Detroit, Mich., assignor, by mesne assignments, to Blair Light Company, Northboro, Mass.

827,835. Gas main bag. John H. White, Jersey City, N. J., assignor of one-half to A. Bell Malcomson, West Orange, N. J.

827,862. Process of producing gas. Heinrich Gerdes, Berlin, Germany, assignor to American Suction Gas Producer Company, Lansing, Mich.

827,871. Gas range. Henrietta W. Lawrence, Baltimore, Md.

Design 38,143 Gas lamp. John Doorenbos, New York, N. Y. Term of patent 7 years.

828,306. Gas calorimeter. Heney L. Doherty, Madison, Wis., assignor to Combustion Utilities Company, New York, N. Y.

828,313. Gas controlling apparatus. Joseph Higginson, Jr., Stockport, England.

828,492. Body of woven fabric for incandescent lights. Friedrich A. Maczjossek, Hamburg, Germany, assignor to the Firm of Gasgluhlicht Gesellschaft, Hamburg M. B. H., Hamburg, Germany.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, August 10th, 1906.

The Responsibilities of Gas Companies.—Gas Companies and "the Trade."—A Progressive Gas Company.

Last month I was noticing the responsibilities of gas companies, not only in respect to the acts of their own workmen, but also in regard to ignorant or negligent third parties. It is just in respect to these cases that they are liable to suffer, because if they go to law in resisting a claim there is too often a disposition, especially when the case goes before a jury, to give them, not the benefit, but the burden of the doubt. They are viewed as a rich and powerful corporation enjoying special privileges, to whom the gain or loss of an action is a matter of no moment, while the complainant may be a poor individual whose nether millstone is involved in the dispute, and sometimes they are even made to feel that it is rather mean or grasping to allow an action to come into court. No consideration is given to the fact that gas companies as a rule have to face an enormous number of claims for damages in one form or another, and that the directors have their duty, not only to the shareholders but also to the consumers, to consider. They have no right to exercise liberality with the trust funds for which they are responsible, and if a company made it a rule not to defend any claims made on them, that company would not pay a high dividend, and also it would not be notable for selling cheap gas. The question now in view is the responsibility in respect to common fittings. Although in point of law the liability of the gas company ceases at the inlet of the meter, they find it necessary to have something to say about the arrangements right up to the burner; because, if from any cause there is an insufficient supply, the gas company are the first to be blamed. It is so easy for the plumber or paper hanger, who calls himself a gasfitter, but whose knowledge of gas does not extend beyond screwing or soldering pipes, and whose ignorance is really the cause of the trouble, to shield himself behind the gas company.

Frequently the gas company are called upon to fix a meter in a house that has been empty for some time, perhaps for years, but which has been previously piped for gas. It may have been occupied by several different tenants, each of whom has added to or altered the gasfittings to suit his requirements, and the gas company are asked to turn on the gas and see that the fittings are all right, which means that they are expected to guarantee and become responsible for the soundness of a system of pipes about which they know nothing and the greater part of which are hidden from view. The man who can properly negotiate a job of this sort requires to possess a degree of intelligence and technical knowledge far beyond that to be expected of an ordinary skilled gasfitter. Indeed, it would pay any gas company to train a smart young man specially to the work of detecting leakages. Or the gas company, if they undertake general gasfitting, may be called upon to remedy a leakage, which they have first to locate, and the information available as to the run and locality of the pipes is of a most indefinite character, while the occupier does not want his business operations or household comfort disturbed by moving goods or furniture and taking up boards to trace the pipes. Matters are not assisted by the fact that tenants, when they leave and after having the meter taken away, do not hesitate to cut off any fittings or pipes belonging to them, without the slightest thought of the safety or convenience of the next occupier.

These considerations are suggested by an action brought against the owner of a cottage at Glasgow, in respect to personal injuries received through an explosion of gas. The premises, which appear to comprise two rooms only, have been piped for gas, and the same used by successive tenants for several years. When the present occupier entered into possession in February last, he sent to the gas office for a prepayment meter. This was fixed, and the fitter noticed that when the gas was turned on to the meter, it passed a considerable quantity, showing the existence of a serious leakage. As it was then late in the day he shut off the gas and warned the tenant that it must not be used that evening, as there was a leakage. But after he had left, the tenant found some slight defect in the pipes and remedied it. Concluding that he had discovered and stopped the leakage, he turned the gas on and used it in one of the rooms. About 2 hours after, his son went into the other room with a light, when a violent explosion ensued, which blew out one of the walls. The lad and also a younger son were terribly injured and burned, and it was in respect to these injuries that the action was brought. The cause of the explosion was found to be an open ½ inch pipe, which had been cut off flush with the face of the wall. After hearing the evidence, and the summing up by the judge, the jury returned a unanimous verdict to the effect that the owner of the premises was not liable.

This is a very mixed up case, in which the gas company, if they figure at all, do so in a very minor degree. The fitter having warned the tenant not to use the gas, might reasonably anticipate that his advice should be followed, and could scarcely be expected to clinch his caution by frightening his prospective customer into fits by quoting fearful examples of the injury caused by explosions of gas. The direct offender was the party who cut off the pipe and left it in a dangerous condition. The room had been subsequently papered and the pipe had apparently been overlooked; at any rate it had been covered, and the defect was then concealed from ordinary observation. Then the tenant himself would have been well advised not to have interfered with the fittings. He evidently had little if any knowledge of gas, and should therefore have acted on the caution received. So far as the landlord is concerned, it is rather surprising that any attempt should be made to fix the blame on him, seeing that no direct negligence or fault on his part could be proved.

It is satisfactory to notice that movements are on foot in Nottingham, Croydon and in London, for the establishment of an arrangement or understanding between gas companies and "the trade." The latter is a somewhat indefinite term, which may be held to include everybody who has negotiated the sale of a gas appliance. Some years ago gas companies found that the use of gas was not so general as it might or ought to be, and inquiry elicted the fact that weekly or short period tenants were not inclined to buy fittings outright, or in fact to pay for them at all, while others found great difficulty in securing the latest appliances or in getting them competently fitted. If they went to an ironmonger or plumber and asked for gas fittings, they were shown a few dusty antiquated articles in some obscure corner of the premises,

and if they selected anything, an old jobber, whose knowledge of gas was decidedly limited, was sent to fix it. The gasfitting trade was practically nothing worth the name. Under these circumstances, it became the general thing for gas companies to undertake hiring and slot meter schemes, by which the first named were secured, and to establish good show rooms and a staff of competent workmen for the benefit of the second. In all cases these efforts met an appreciative response on the part of the public, and the trade beheld the gas company doing a large business in the supply of stoves and fittings. Instead of recognizing the fact that the gas people were not diverting previously existing trade, but establishing entirely new lines, "the trade" chose to imagine that every stove or fitting disposed of was an intrenchment on their province, and adopted a dog-in-the-manger kind of attitude. The reason why the gas people entered into these new departures was not to add a fresh department to their business, but to aid and support the existing one. They wanted to increase the sale of gas, and didn't care about pocketing commissions on hardware goods. If they had kept to the old-fashioned narrow lines followed by "the trade," they would have advanced very little if at all. So far from a desire to compete with or profit at the expense of the trade, they would have welcomed any arrangement on mutual terms, that would carry out the real object they had in view. The real drawback is and has been the jealousy of "the trade."

One of the benefits effected by the recent exhibition at Earls' Court was the establishment of a more friendly understanding between the Gas Light and Coke Company and the representatives of "the trade." The exhibition, in fact, was an object lesson of the fact that "the trade" might flourish under the direct auspices of the gas company, and no doubt the experience gained there was a valuable help in soothing ruffled feeling and in suggesting the basis of the agreement that has now been arrived at. Conferences were held, and an arrangement that meets the approval of both parties is the result. The full text of the same appears in current issues of the gas magazines here, and you will no doubt reproduce it in full, so I will not occupy space by referring to the details. The matter is of importance as a determined attempt to heal up an old sore, and if it proves a success in London will no doubt be accepted as a lead in the provinces. The results of the working as regards increased sales of gas—the main object of the gas company—will be looked for with keen interest.

The usual half yearly meeting of the Gas Light and Coke Company was held August 3d, when a very satisfactory state of affairs was disclosed. It has been evident, by several things that have leaked out, that the directors and staff are making a determined effort to move with the times, that the traditions of the elders will not be looked upon as the leading lines of policy, but that present day conditions will be recognized and provided for. The substance of the preceding paragraph is an instance in point. Also we hear that the Company are prepared to send a lady expert to any customer's house to advise on the use of cooking stoves, of systematic series of popular lectures and demonstrations, of bright, attractive literature, setting forth the advantages of gas in proper style, elegantly printed and illustrated. There is a chief inspector who seems to be here, there and everywhere, and has a happy knack of being in evidence whenever there is a big railway station or an important thoroughfare to be lighted, and in nine cases out of ten he gets the job. Knowing all this, one need not be surprised to find a large increase in the number of consumers and in the quantity of gas sold, with the usual corollary that the profits earned during the half year are sufficient to more than pay full dividend. One thing naturally follows the other. Assuming that affairs are carefully and competently managed, it is safe to say, "Look after the sales and the profits will look after themselves." During the half year the Company have connected up about 16,000 additional meters and nearly as many stoves.

But this satisfactory condition of affairs is in no sense a spontaneous growth, born of good luck. It is artificially created and is the result of good system and management. The Chairman's speech, short as regards the number of words used, but long as regards substance, is just what might be expected in view of the conditions already indicated. Any gas works' director or official who "reads" the speech thoroughly will require to devote considerably more time to it than was occupied by its delivery. With regard to the outdoor staff, the shareholders were told that in the chief inspector's office, outside the staff of officers, 2,000 men were employed, all of whom were more or less in direct contact with the consumers. They include inspectors of burners, mantles, meters and stoves, show room attendants and the workmen who actually fixed appliances or attended to complaints. There was no training school for the education or training of these men, and they had to gradually feel their way after entering the Company's service. This deficiency had been met by the establishment of a system of instruction and demonstrations by a competent expert, with lectures and other assistance from the heads of departments. The staff exhibited full sympathy and interest in this movement, and the result would be that the Company would soon be equipped with a thoroughly competent staff. In this as in the other matters referred to, the Gas Light and Coke Company are not only developing their own resources, but setting a valuable object lesson before the gas business. Every board of directors may well ask, "Are we getting the best value out of our staff that they are capable of affording?" Does not the staff of every undertaking include men tied down to mere routine and paid a bare hand-to-mouth wage, who possess both the energy and ability to do a great deal more in the interests of their employers, if stimulated thereto by more judicious and more generous treatment? If a coal is capable of yielding 10,000 cubic feet of gas per ton, we do not rest satisfied in treating it in such manner as to only yield 9,000. Let the analogy be applied to the whole staff, including the workmen. It is necessary to have a good man at the helm, but not all that is necessary. Yet a very common idea is, granting the necessity for a good head, that the rank and file may consist of the cheapest labor obtainable. The action of the Gas Light and Coke Company suggests a different line of policy.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE Gas Machinery Company, of Cleveland, O., has received an order from the Green Bay (Wis.) Gas and Electric Company for the installation of coal gas apparatus, consisting of exhausters, condenser, washer and scrubber, and also for purifying apparatus, all to take care of a daily capacity of about 250,000 cubic feet; also an order from the Menominee and Marinette (Wis.) Light and Traction Company, for gas apparatus to increase its purifying capacity to 150,000 cubic feet per day.

IT does not seem likely that the measure known as the State gas ordinance, which has been before the "local legislature" of Lewiston, Me., for some time, and which is intended more than probably as a flail for the threshing out of the business of the old Lewiston Gas Light Company, will ever become effective.

THE contract awarded some time ago to the Empire Gas Improvement and Construction Company, whose headquarters are at 49 Wall street, New York, by the corporation of the city of Guelph, Ont., is rapidly nearing fulfilment. The main items in the contract were: One double-lift holder, having a capacity of 150,000 cubic feet, and 3 stone houses, steel and slate roofed. The first of these is to cover 4 benches of 6's, to be operated on the half-depth plan, room being allowed for 3 additional benches. The daily capacity of the initial 4 benches can be safely put at 240,000 cubic feet. The second house is arranged for the sequence of apparatus, including a tar extractor, 2 exhausters, scrubbers and condensers, a separate room being allotted to the station meter and street governor apparatus. The third house contains the water gas apparatus and its attendant machinery, the daily capacity of the outfit being 350,000 cubic feet. The old coal gas benches have been supplying the city for several weeks, the output going through the new holder. The water gas a paratus will be in active operation about October 1st. When finished the plant will be one of the "best in Canada, and the equal of any elsewhere in a city of this size." So writes Mr. A. M. Sutherland, and he usually knows that of which he writes.

MR. RICHARD L. SPIERING has resigned the superintendency of the gas division of the properties of the La Crosse (Wis.) Gas and Electric Company to accept a similar position with the Public Service Company, of St. Cloud, Minn. The new coal gas plant of the St, Cloud Company is well underway.

ADVICES from Cincinnati, O., dated August 24th, are to the effect that, at the special meeting of the shareholders in the Cincinnati Gas and Electric Company, held the 23d ult., it was voted unanimously to lease the plant and business to the Union Gas and Electric Company, as per the terms previously indorsed and recommended by the Directors of the Cincinnati Gas Company. In the main the terms direct that the holding Company shall pay to the shareholders a return of 4½ per cent per annum for a period of 2 years, after which the rate shall be put at the figure of 5 per cent. The holding Company is to deposit a sum of money equal to $3,000,000 as a guarantee that the dividends will be paid, and the whole scheme is to actively date from September 1st.

WRITE to Mr. Robert E. Livingston, Editor and Publisher of "Gas Logic," for a copy of the issue of that brochure for last month. It

scheme is a good one (we believe it is really fathered by the Consolidated Gas Company) and the August copy well illustrates the plan and scope of the booklet. Mr. Livingston's address is No. 1 Madison avenue, New York city.

AT a meeting of the Consumers Gas Company, of Toronto, Ont., held the last week in August, the Company decided to offer to the city authorities gas for street lighting purposes at the rate of 80 cents per 1,000 cubic feet, provided the authorities would agree to making a contract on that basis covering a period of 5 years. No determination had been reached at this time of writing.

ARTICLES were filed last week in the office of the Secretary of State of Connecticut, incorporating the Twin States Gas and Electric Company, of Hartford, Conn. The Company, which is capitalized in $1,750,000, has been organized to take over the properties of the Brattleboro (Vt.) street railway and gas companies, and those of the Dover (N. H.) Gas Company.

IT is said that the determinations so far made by Dr. A. G. Leonard, State Geologist of North Dakota, and his associates, respecting the values of certain coals discovered in large deposits in North Dakota and Montana, go to show that they may be used successfully in the manufacture of gas.

THE Massachusetts Board of Gas and Electric Light Commissioners has granted the proprietors of the Malden and Melrose Gas Light Company, the right to issue 5,265 shares of additional stock at an upset price of $120 per share. The money so raised is to pay for certain improvements.

MR. FRANK D. MOSES, of Trenton, N. J., has brought suit against Messrs. J. W. Morgan, David Baird, J. E. A. Armstrong and John J. Burleigh, for an accounting of profits accruing under an agreement respecting certain transactions between them involving the construction, sale, etc., of the Cape Island (N. J.) Gas Company and the Cape May Illuminating Company—the latter concern succeeded the former.

THE new owners of the Williamsport (Pa.) Gas Company will take full possession of the properties thereof not later than the 10th inst. Mr. F. P. Dugan has been in charge since the resignation of Mr. M. H. Spear.

THE handsome offices of the Utah Gas and Coke Company, of Salt Lake City, Utah, will be completed early this fall. They are certainly a pronounced addition to the business quarters of Salt Lake City, and give positive evidence of the wakefulness of the management of the Company.

SUPERINTENDENT BIGELOW, of the Allentown (Pa.) Gas Company, reports that the hooking-up of Muhlenberg Cottage with the mains of the Company will be completed in a week or so. The main is 4,000 feet in length, is of 6-inch diameter, and is being put down at the expense of the Company, which will also pipe the buildings free of charge.

TITLE to 8 acres of land in Still River, Mass., has been taken by the proprietors of the Boston Light, Heat and Power Company, who propose to eventually construct thereon a plant equal to supplying electricity and gas to the residents of Leominster, Groton and Harvard. The Company owns other land in Still River adjoining the recent purchase. It might be added that the plan ultimately will result in the supply of gas and electric currents to the towns of Clinton and Lancaster. This deal likely means busier times than ever ahead for Superintendent Fullam.

MR. C. B. ADAMS, as the result of an examination of the physical condition of the manufacturing and distributing divisions of the City Gas Company, of Beatrice, Neb., which concern has been in the hands of a receiver (Mr. H. V. Riesen) for some time, recommended to the owners an extensive scheme of reconstruction. The scheme was ratified and quite a goodly sum has been voted to carry out the work. The generating system will be completely reconstructed and sensible additions to the distributing division of the property have been arranged.

COL. E. G. PRATT, who was "transferred" some months ago from the dual position of President and General Manager of the Milwaukee (Wis.) Gas Light Company, to take up the management of the Detroit (Mich.) Gas Company, has resigned, the resignation becoming effective the 1st inst. He will take up his residence in Milwaukee, where for some years prior to his going to Detroit he acted with marked success as Vice-President and General Manager of the Milwaukee Gas Light Company. In the latter position Col. Pratt succeeded Mr. E. G. Cowdery, now in active charge of the properties of the Laclede Gas Light Company, of St. Louis, Mo. We are not advised as to the Colonel's future business activity, but, be his choice that which it may, the JOURNAL wishes him all possible good luck. For a long term he has served in harness in the gas trading of both the East and the West, and in that term he was always a credit to his profession and a man whose personal record bears not a single smirch.

COLONEL PRATT'S successor to the Detroit position is Mr. Irvin Butterworth, who for well over 2 years has been President and General Manager of the Grand Rapids (Mich.) Gas Light Company. Mr. Butterworth's successor in Grand Rapids is Mr. B. O. Tippey, former works' engineer at Detroit.

IT is positively stated that the Parker Gas Producer Company, of St. Joseph, Mo., will put in a plant at Columbia, Mo. The franchise under which the owners of the latter are to operate restricts the selling rate to $1 per 1,000 cubic feet.

ACCORDING to the statement recently filed with Controller Jay by the Detroit City Gas Company, the output for the half year ended June 30 last was 1,033,744,700 cubic feet. Of this quantity the city used on public account 5,514,400 cubic feet.

THE Industrial Gas Company, of New York city, with a capital of $175,000, has been incorporated to manufacture gas appliances.

THE Birmingham (Ala.) Railway, Light and Power Company will complete the new distributing service to the nearby borough of Ensley this fall. The Company has also under consideration the supplying of gas to the borough of Wylam.

THE proprietors of the Mobile (Ala.) Gas Company are fitting up commodious office quarters in the building at the junction of Conception and St. Francis streets. The situation is an excellent one, being in the business section of the city, and easily reached from all its quarters.

THE capitalization of the Gainesville (Tex.) Gas and Electric Company has been fixed at $250,000, which figure certainly seems ample.

MR. WILLIAM DARBEE, who was appointed gas expert to the New York State Commission of Gas and Electricity, last December, has resigned that position to accept the post of General Manager of the Albany and Hudson Railroad. Mr. Darbee is a graduate of the Stevens Institute of Technology, and was formerly Assistant General Manager of the Connecticut Railway and Lighting Company, of Bridgeport, Conn.

"ANOTHER chapter in the artificial lighting supply of Fishkill and Matteawan, N. Y., has been completed," so writes a correspondent under date of the 24th inst., who furthar says that "a week or so ago the Southern Dutchess Gas and Electric Company, of Fishkill and Matteawan, an electric light company operating under lease of the Citizens Railroad, Light and Power Company, made application to the State Commission of Gas and Electricity for consent to issue bonds to the amount of $90,000 for the purpose of acquiring and improving the property lately owned and operated by the Fishkill and Matteawan Gas Company, the plant of which was recently sold under foreclosure of a mortgage given to the Knickerbocker Trust Company by a committee of the bondholders. A hearing will be given by the Commission on the 5th inst."

"THE fourth annual picnic of the employees of the Grand Rapids (Mich.) Gas Light Company, which was held in Lake Michigan Park, Muskegon, Mich., some days ago, was a grand success. Over 500 folks, old and young, shared in its privileges and enjoyed its pleasures," says a correspondent, who writes under date of the 29th inst. He further adds: "Modesty compels one to omit the names of the men actively in charge, and I only mention the thing at all merely to show that such affairs are worthy of emulation, for they certainly add to the popularity of the Company in whose districts like deeds are done."

CERTAIN parties, seemingly desirous of purchasing control in the old Bridgeton (N. J.) Gas Light Company, and having evidently failed in their purpose, have organized the Peoples Gas Light and Fuel Company, with the object of bringing the old Company "to terms." A franchise has been asked for, and the capital of the concern has been put at $75,000. The old Company has served the people of Bridgeton faithfully, lengthily and well, and is now selling gas at $1.10 per 1,000 cubic feet, a rate that no one else can compete with and make any fair sort of return on the investment.

MR. M. CASWELL, formerly of Ticonderoga, N. Y., has accepted a position with the Granville (N. Y.) Gas and Electric Company.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, SEPTEMBER 3, 1906.

The Market for Gas Securities.

The market record for local gas shares showed no particular change in quotations in the week. Consolidated sold off something over a point, but there was no particular reason therefor, and dealings were on a restricted scale. Gas bonds were steady.

Peoples, of Chicago, was steady, and the same may be said of the general out-of-town list. There was some pretty good buying of Massachusetts gas, despite the fact that the quotations are reported a trifle lower.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

SEPTEMBER 3.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	139⅛	140⅛
Central Union Gas Co.—				
1st 5 s, due 1912, J & J	3,000,000	1,000	101	104
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	..	105
Mutual	8,500,000	100	225	250
New Amsterdam Gas Co.—				
1st Con. 5 s, due 1948, J. & J.	11,000,000	1,000	100	103
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1s Mtg. Gold Bds. 5 p. ct.	1,000,000	..	98	104
Northern Union—				
1st 5's, due 1927, J. & J	1,250,000	1,000	101	103
New York and East River—				
1st 5 s, due 1941, J. & J.	3,500,000	1,000	108	111
Con. 5's, due 1945, J. & J.	1,500,000	..	104	110
Standard	5,000,000	100	140	160
Preferred	5,000,000	100	155	175
1st Mtg, 5's due 1939, M.&N.	1,500,000	1,000	104	108
The Brooklyn Union	15,000,000	1,000	110	130
1st Con.5's,due 1948, M.& N.	15,000,000		107	..
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Bay State	50,000,000	50	5/16	¾
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	65
" 1st Mtg. 5's	509,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000.000	1.000	47½	50
Buffalo City Gas Co.	5,500,000	100	9	10
" " Bonds, 5's	5,250,000	1,000	75	80
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1.000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	106¾
Cincinnati Gas and Electric Co.	29,500,000	100	103¼	103¾
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	90	..
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	..	95
Preferred	3,026,500	100	107½	108
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	..	90
Mortgage, 6's	3,600,000	..	..	118
Chesapeke, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	..	..	100
Detroit City Gas Co	5,000,000	50	..	50
" Prior Lien 5's	4,613,000	1,000	..	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,325,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	110	112
" Bonds, 5's	10,500,000	..	107½	108½
Indianapolis	2,000,000	..	60	70
" Bonds, 5's	2,650,000	..	104½	105
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	35
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	105
Preferred	2,500,000	100	95	110
Bonds	10,000,000	1,000	104	104¼
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	106	108½
" 6 per cent. scrip, due 1910	100,000	25	85	87
Massachusetts Gas Companies of Boston	25,000,000	100	58⅜	58½
Preferred	25,000,000	100	89	89½
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	6,000,000	..	137	138
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	91¼	91⅜
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	104½	105¼
San Francisco, Cal.	15,800,000	100	..	..
St. Joseph Gas Co. 1st Mtg. 5's	751,000	1,000	92	..
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	96¼	..
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047 000	1,000	102	..
Washington, D. C	2,000,000	20	295	300
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600,000	50	230	..

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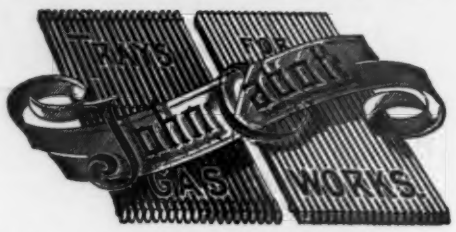

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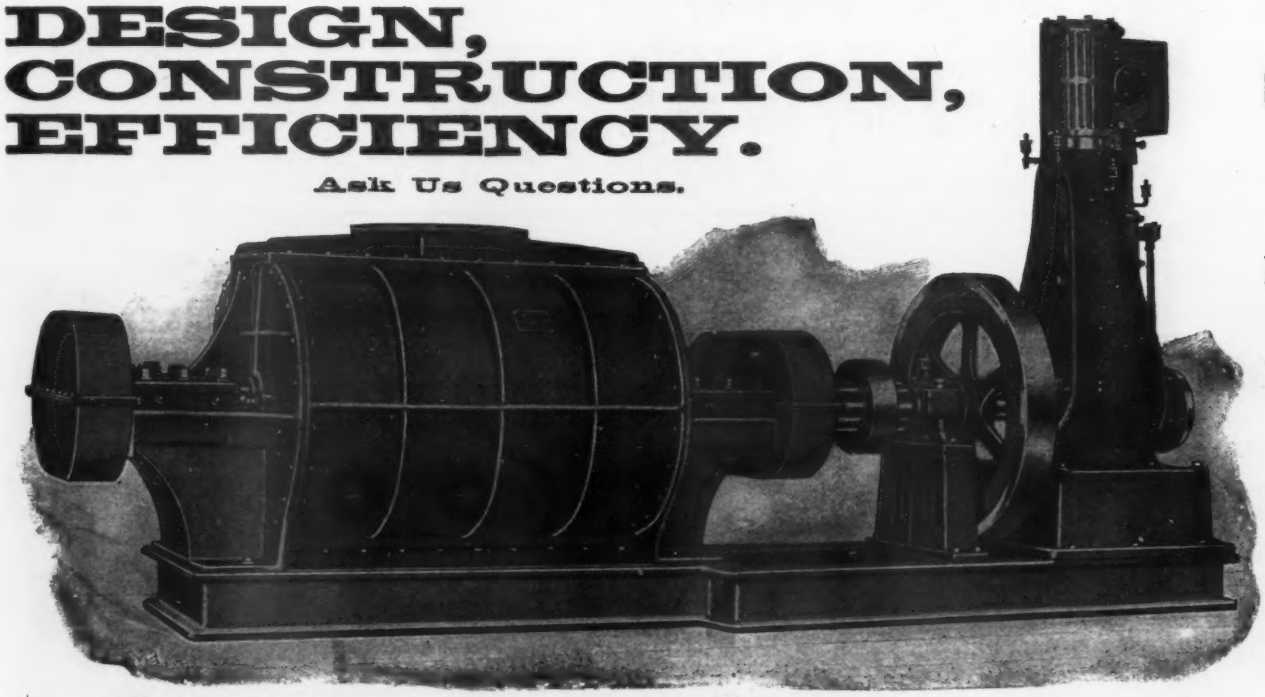

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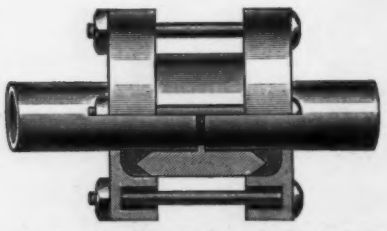
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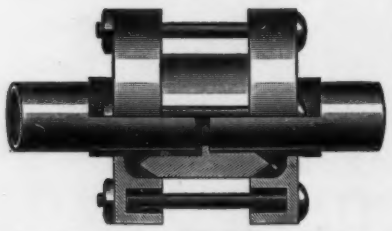
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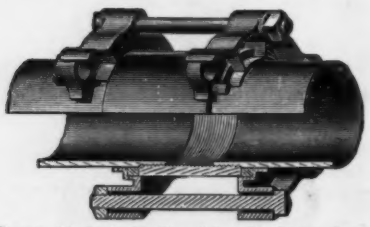
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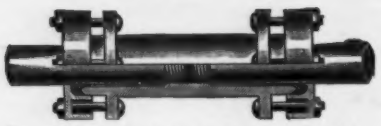
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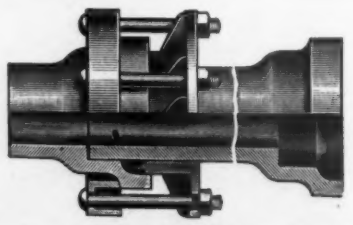
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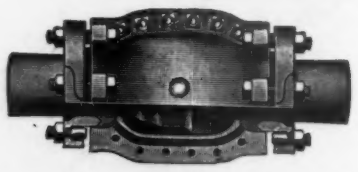
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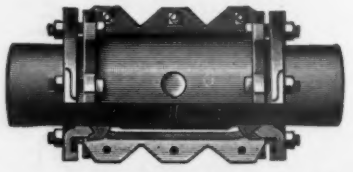
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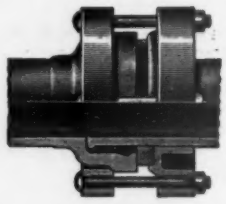
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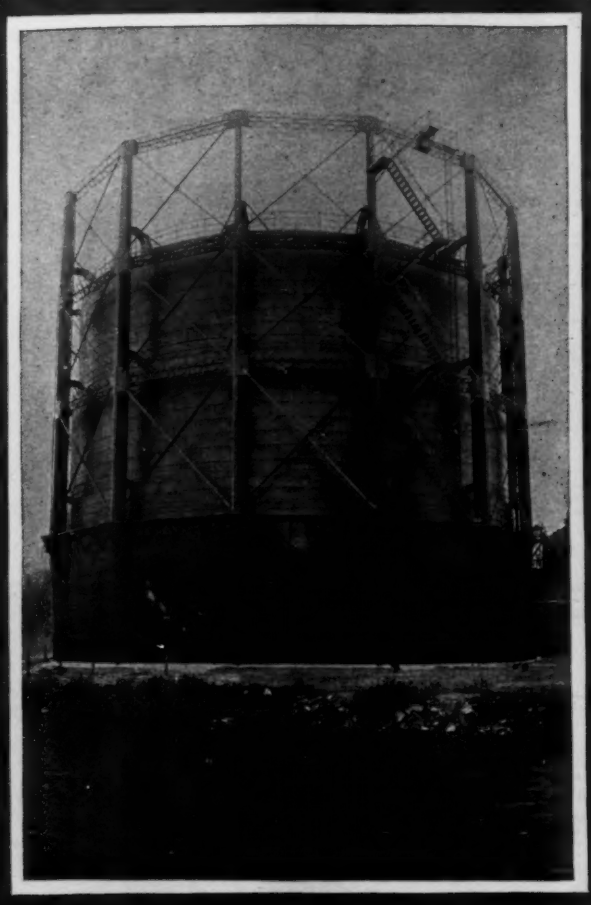

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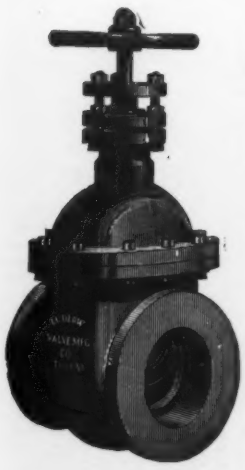

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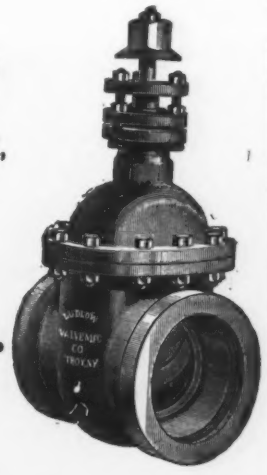

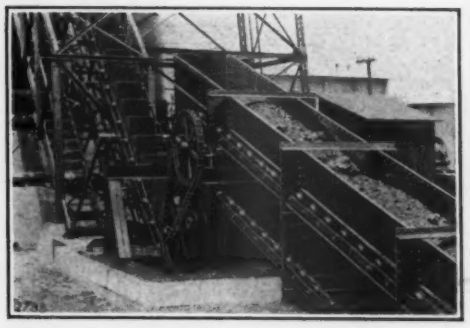

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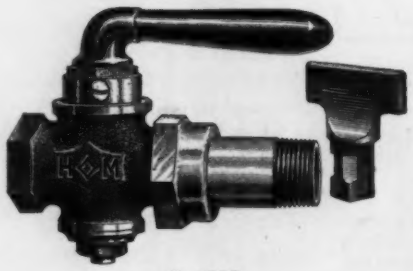

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These cocks can be fit in without the ends of the pipes being on the same line. The ball joint gives the coupling a range of adjustment that allows it with the attached pipe to set at a considerable angle with the body of the cock, and be gas tight.

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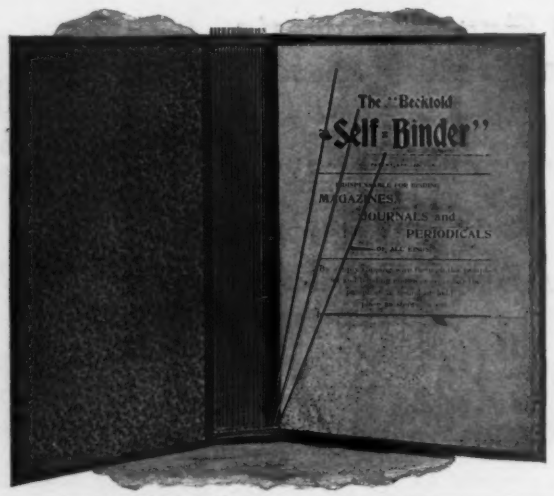

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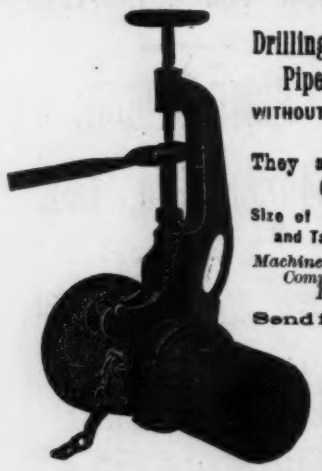

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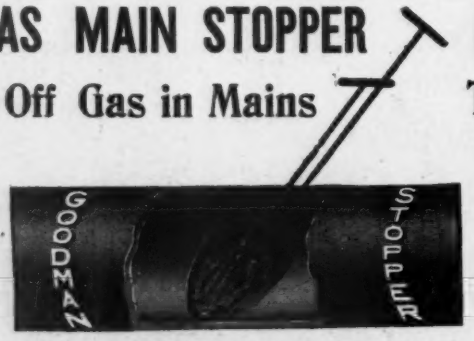

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THE PURIFIED GAS REVIVES THE FOULED OXIDE.

FIELD'S ANALYSIS

For the Year 1905.

An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland. Being the 37th Year of Publication.

COMPILED AND ARRANGED BY **JOHN W. FIELD,**

Secretary and General Manager of The Gas Light and Coke Company, London.

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Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

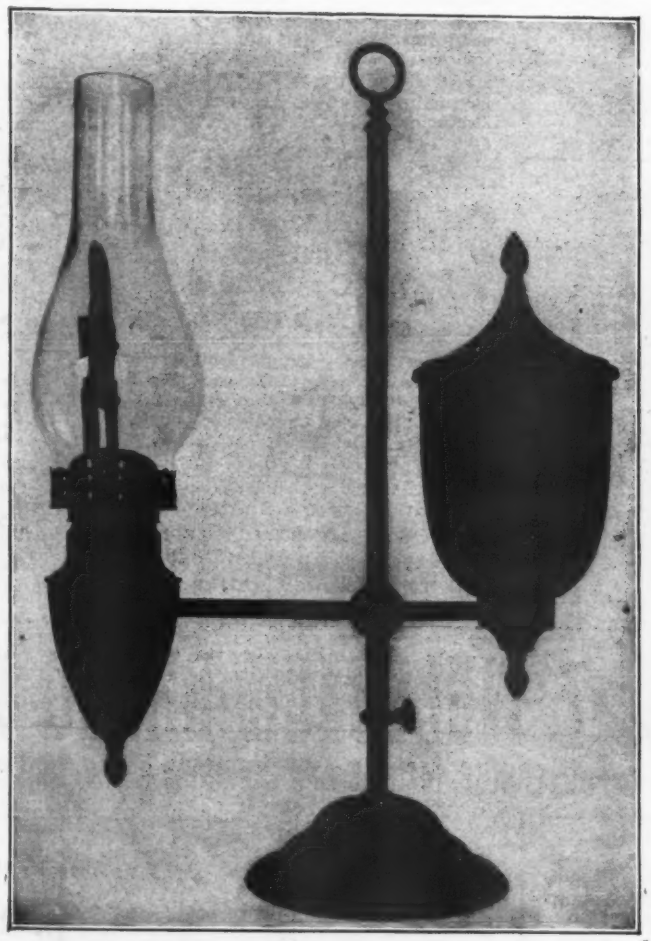
SEPTEMBER, 1906.

Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.
Sat.	1	No L.	No L.
Sun.	2	No L. FM	No L.
Mon.	3	No L.	No L.
Tue.	4	7.00 PM	8.40 PM
Wed.	5	7.00	9.10
Thu.	6	7.00	9.40
Fri.	7	7.00	10.10
Sat.	8	7.00	10.40
Sun	9	6.50	11.10
Mon.	10	6.50 LQ	11.50
Tue.	11	6.50	12.40 AM
Wed.	12	6.50	1.30
Thu.	13	6.50	2.20
Fri.	14	6.50	3.20
Sat.	15	6.50	4.40
Sun.	16	6.30	4.40
Mon.	17	6.30	4.40
Tue.	18	6.30 NM	4.40
Wed.	19	6.30	4.40
Thu.	20	6.30	4.40
Fri.	21	6.30	4.40
Sat.	22	6.30	4.40
Sun.	23	8.40	4.50
Mon.	24	9.30 FQ	4.50
Tue.	25	10.30	4.50
Wed.	26	11.30	4.50
Thu.	27	12.30 AM	4.50
Fri.	28	1.40	4.50
Sat.	29	2 40	4.50
Sun.	30	3.50	4.50

TOTAL HOURS DURING 1906.

By Table No. 1.

	Hrs. Min.
January	223.40
February	190.40
March	192.10
April	167.00
May	152.20
June	142.10
July	150.20
August	157.40
September	170.00
October	185.10
November	201.40
December	214.00
Total, yr.	2146.50



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❋❋❋

10-Candle Power.

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This lamp is a perfect substitute for the 10-candle Pentane Lamp hitherto used, and has the following advantages:

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2d. It is remarkably steady. Will burn 24 hours continuously with less than 2 per cent. variation.

3d. It is much less dangerous than Pentane, which is a kind of gasolene.

4th. It is not easily affected by air currents in the photometer room.

5th. Since the lamp may burn continuously, the candle power of gas may be taken at any moment, if necessary. This insures steady illuminating power without waste of carburetting material.

6th. The first cost of the lamp brings it within the reach of even small gas works.

7th. Costs much less to maintain than a Pentane lamp or sperm candles doing the same service.

8th. Is not affected by the weather.

PUBLIC LIGHTING TABLE.

SEPTEMBER, 1906.

Day of Week.	Date.	Table No. 2. NEW YORK CITY. All Night Lighting. Light.	Extinguish.
		P. M.	A. M.
Sat.	1	6.30	4.20
Sun.	2	6.30	4.20
Mon.	3	6.15	4.30
Tue.	4	6.15	4.30
Wed.	5	6.15	4.30
Thu.	6	6.15	4.30
Fri.	7	6.15	4.30
Sat.	8	6.15	4.30
Sun.	9	6.15	4.30
Mon.	10	6.05	4.40
Tue.	11	6.05	4.40
Wed.	12	6.05	4.40
Thu.	13	6.05	4.40
Fri.	14	6.05	4.40
Sat.	15	6.05	4.40
Sun.	16	6.05	4.40
Mon.	17	5.55	4.50
Tue.	18	5.55	4.50
Wed.	19	5.55	4.50
Thu.	20	5.55	4.50
Fri.	21	5.55	4.50
Sat.	22	5.55	4.50
Sun.	23	5.55	4.50
Mon.	24	5.40	5.00
Tue.	25	5.40	5.00
Wed.	26	5.40	5.00
Thu.	27	5.40	5.00
Fri.	28	5.40	5.00
Sat.	29	5.40	5.00
Sun.	30	5.40	5.00

TOTAL HOURS DURING 1906.

By Table No. 2.

	Hrs. Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 512 Oak Street.

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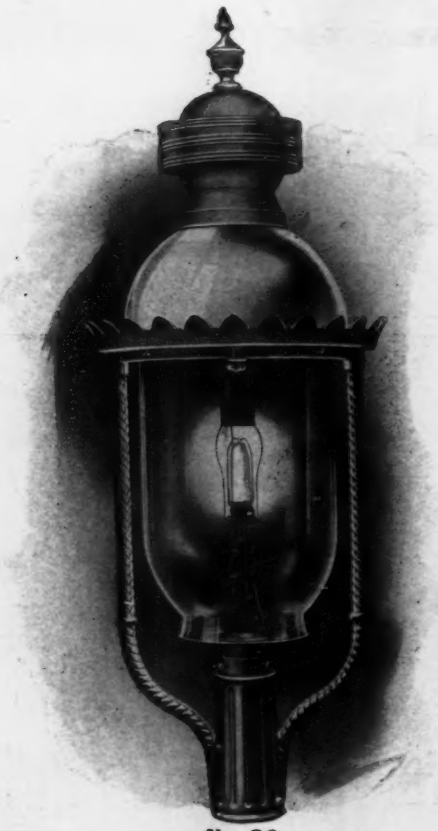
....OF AMERICA....



No. 36.

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By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

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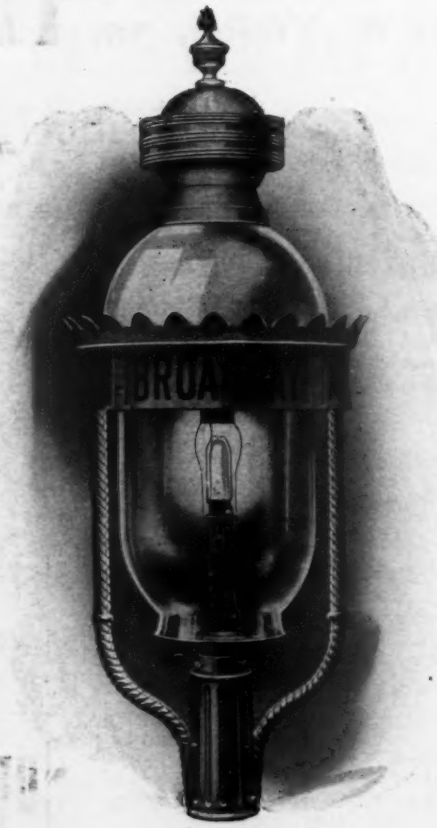
IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.



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Finished in oxidized copper, oxidized brass, etc., 25 cents extra.

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Special colors require a few days extra time to fill orders.

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TOTAL DAILY CAPACITY TO JULY 1, 1906, 488,930,000 CUBIC FEET.

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An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland. Being the 37th year of publication. Compiled and arranged by JOHN W. FIELD, Sec'y and Gen. Mgr. of The Gas Light and Coke Company, London. Price, $5. For Sale by
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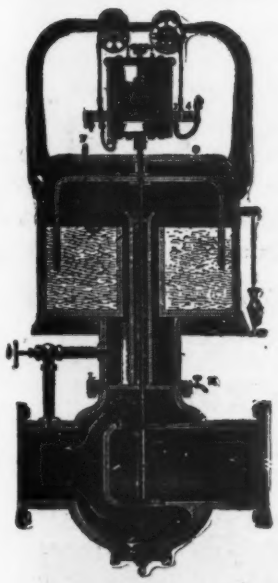

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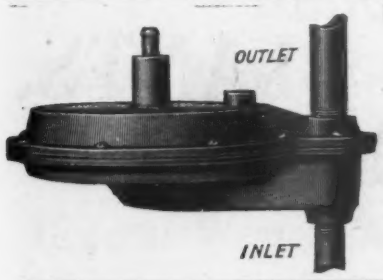

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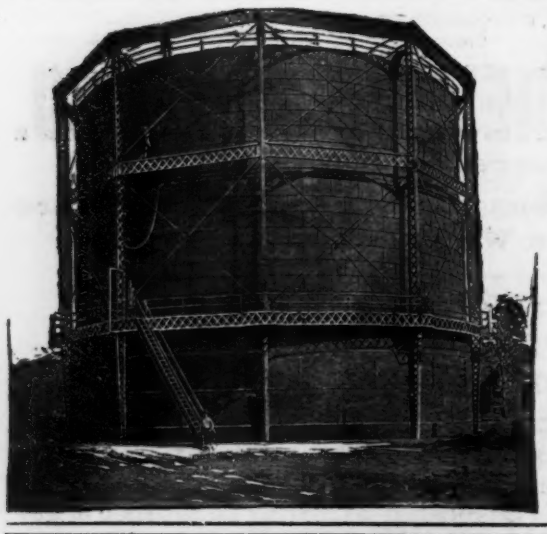

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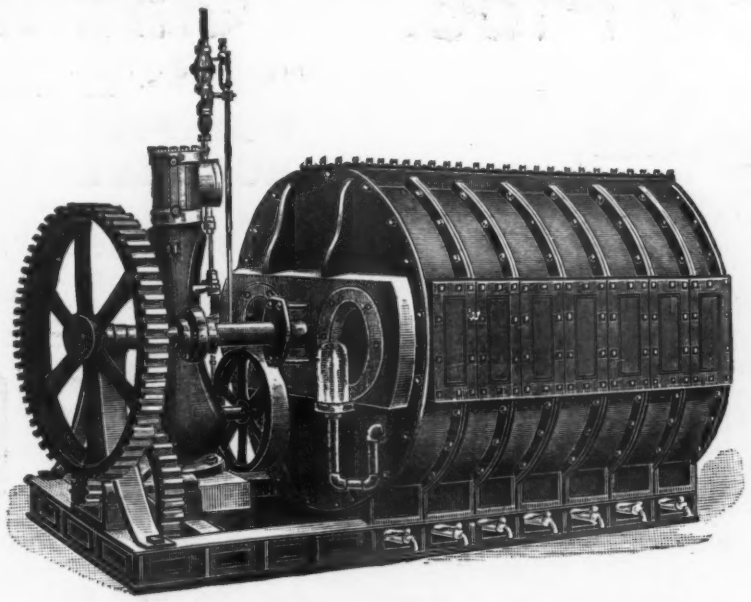

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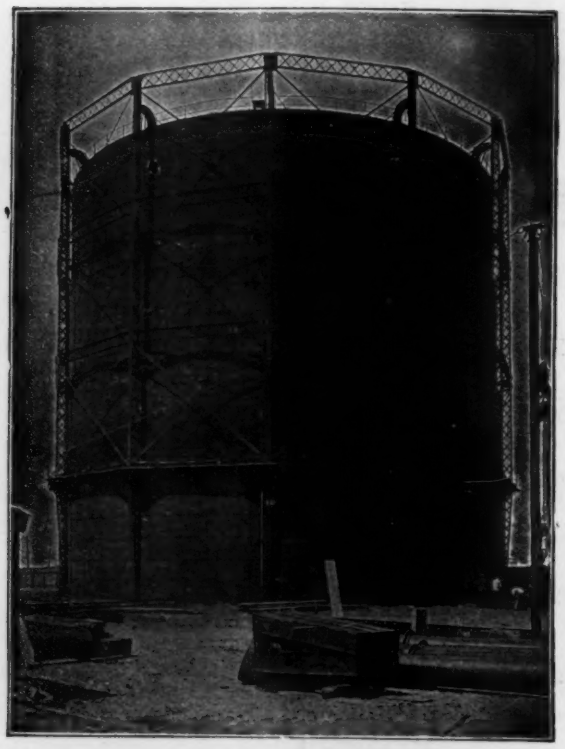

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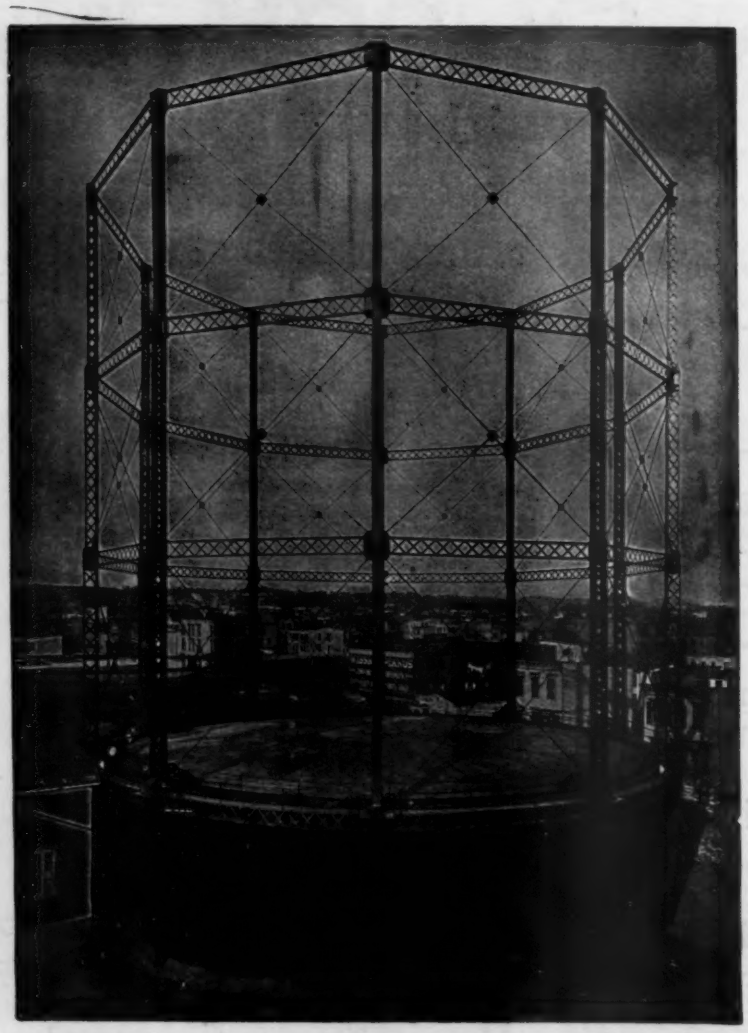

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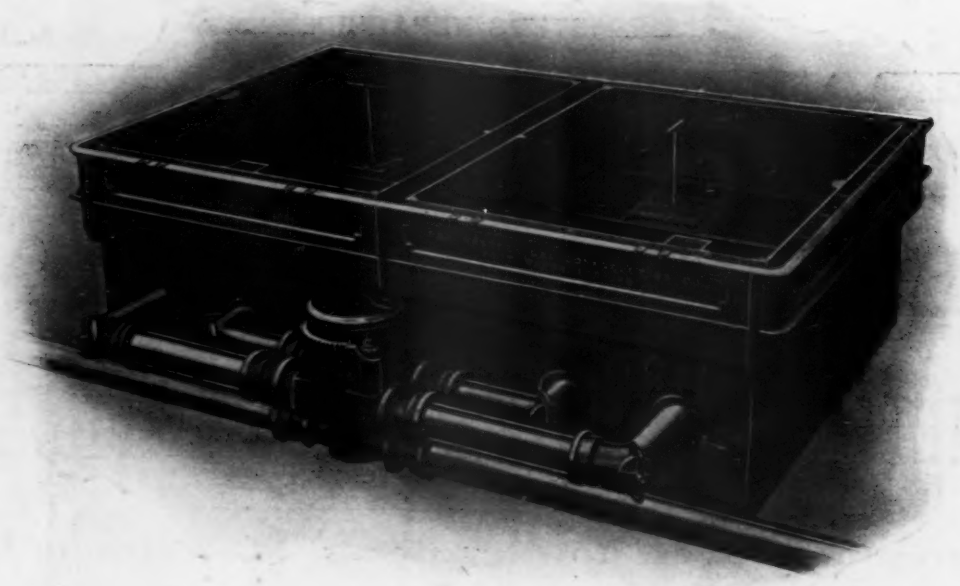

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